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THE
Univerſal Arithmetic,

CONTAINING

All the RULES in Arithmetic,

After a New and most Concise Method;

Vulgar and Decimal Fractions,

THE

SQUARE and CUBE ROOTS,

With a brief Explanation of their Uſe;

MENSURATION and SURVEYING:

TO WHICH ARE ADDED,

A great Variety of Practical Questions, &c.

The Whole Scientifically laid down in a plain and easy Manner, for the Use of Schools,—private Families, and the Rising Generation in general.

By R. CHAPPELL, *late T. M.*
St. Mary-le-Bone, London.

1/4

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1798.

PREFACE:

AFTER many Years Study and Practice, I have, *at last*, completed this useful and neceſsary BOOK, (for the benefit of Youth), which now stands offered to the Public, hoping it will meet their Approbation.

I have not designed this Work any way Abstruse or extraordinary profound, but have by all Means poſſible, endeavoured to render it easy and useful.

And, as there are many promising Youths, (who by the ſmallneſs of their Fortunes, or neglect of their Parents) are under the Necessity of improving their Minds with useful and neceſſary Learning;—to such as those, in particular, I am certain it will be of infinite Use, not only as the shortest and easiest Method, but by its intrinsic Difference from all other Publications of the Kind, ever yet offered to the Public; so that this present Treatise being ſully explained, must needs gain the Attention of all who have the least Inclination to cultivate their Knowledge, and whose Understanding soar to the Sublimity of the *Theory* and *Practical Art* of this laudable Undertaking.

This little Monitor is published for the use of private Families as well as public Schools, so that those who are inclined to learn at Home, will have the Opportunity to paſs their leisure time in cultivating themselves with useful and literary Learning, which will prove a Pleasure to Youth, and Comfort to old Age.

Permit me therefore, to inform you, that I have made it my chief Study and Care to point out to the Learner, every article that is neceſsary in different Branches of Busineſs, as well as in practical Arithmetic; for which Reason I have inserted a great Number of Examples in different Denominations of Trade:——am also fully persuaded it will be of infinite Use and great Utility to every diligent Master, who has a great Number of Pupils, and other Difficulties to labour under.

All these Rules are grounded on Variety, and dilivered with Sincerity; the Examples are builded up gradually from the smallest Consideration, to the greatest Produce.

Oh! happy Parents, who willingly pay the full Price of Industry and Exercise, for those Arts and choice Accomplishments to their Children, and must contribute greatly to their Happineſs in a future State; which is the sincere Wishs of,—Ladies and Gentlemen,

Your most Obedient,

Humble Servant,

and *Well-wisher,*

Richard Chappell.

LONDON Feb. 1, 1798.

KIND READER:

If these Sheets perus'd with Care, you'll find,
What will improve and entertain the Mind:
Instruction 's here to ev'ry Rule and Art,
To ease the Mind, and cultivate the Heart;
——Those that do their precious Time bestow,
They will in pious Arts their Knowledge shew;
Among the Wise, in Wisdom they will be,
And plac'd with Saints, or Men of high Degree:—
For they that do their Knowledge thus increase,
Their Gain shall be the sweets of—lasting Peace,

TO THE CRITIC.

Critics may doubt, as stoics do of Pain,
But let them read this Book and doubt again;
Nature and Sense will force the unwilling Sound,
No Critic doubted, when the Truth he'd found
For if he thinks a faultless Piece to see,
He thinks what ne'er was, is, nor e'er will be.

THE

Universal Arithmetic.

NUMERATION,

NUMERATION teacheth you how to read a sum of Figures propounded, or to write down any Sum required, which is to be done by knowing the Order and Value of Places, as in the following Table.

TABLE,

TABLE, I.

9 Place 1 Hundredof of Millions.
8 ..... 2 2 Tens of Millions.
7 ..... 3 3 3 Millions.
6 ..... 4 4 4 4 Hunds. of Thousands.
5 ..... 5 5 5 5 5 Tens of Thousands
4 ..... 6 6 6 6 6 6 Thousands,
3 ..... 7 7 7 7 7 7 7 Hundreds,
2 ..... 8 8 8 8 8 8 8 8 Tens,
1 ..... 9 9 9 9 9 9 9 9 9 Units,

Note, Every Cypher prefixed to the Right-hand of a Unit or 1, increaseth its Value Tenfold proportionably as shewed by the following Table.

TABLE II.

1	Unit one.
1 0	Ten.
1 0 0	One Hundred.
1 0 0 0	One Thouſand.
1 0 0 0 0	Ten Thouſand,
1 0 0 0 0 0	One Hundred Thouſand.
1 0 0 0 0 0 0	One Million.
1 0 0 0 0 0 0 0	Ten Million.
1 0 0 0 0 0 0 0 0	One Hundred Million.

Write down in Figures One Hundred and Two?
Anſwer, 102.

One Hundred Thouſand, Threeſcore and Nine?
Anſ. 100069.

Sixteen Score Million, three Hundred and Seventeen? *Anſ.* 320000317.

Half a Million? *Anſ.* 500000.

A Million wanting One? *Anſ.* 999999.

One Hundred twenty-three Thouſand, four Hundred fifty-ſix Million ſeven Hundred eighty-nine Thouſand, nine Hundred eighty-ſeven Million, ſix Hundred fifty-four Thouſand, three Hundred and twenty-one?
Anſ. 123,456,789,987,654,321.

ADDITION.

ADDITION.

ADDITION is the collecting together, of two or more Sums, either of one, or of different Denominations, into one Sum, which is called *a total Sum.*—Obſerve to place your Numbers one under another, that Units may ſtand under Units, and Tens under Tens, and ſo of any other Number.

Example.

Pounds.	Ounce.
12481	9876
21352	5432
34528	1012
43012	4567
56781	8643
65432	2345
233586	31875

Example II.

			1			
		2	2	2		
	3	3	3	3	3	
4	4	4	4	4	4	5
	6	6	6	6	6	
		8	8	8		
			9			
5	5	6	5	4	3	5

Example III.

Hogſheads.

	1	2	4	3			
		5	6	7	8		
			9	0	1	2	
				3	4	5	6
			7	8	9	0	1
		2	3	4	5	6	7
	8	9	0	1	2		
		3	4	5	6		
			7	8	9	0	
				1	2	3	4
			5	9	7	8	
		9	0	9	8		
	7	6	5	4			
2	0	1	6	5	3	5	8

MONEY.

THE moſt uſual Coins or Denominations of Money, uſed in *Great-Britain*, are Pounds, Shillings, Pence, and Farthings.

1 Farthing	$\frac{1}{4}$	§	4 Farthings	make	1 Penny.
2 Farthings	$\frac{1}{2}$	§	12 Pence		1 Shilling.
3 Farthings	$\frac{3}{4}$	§	20 Shillings		1 Pound.

Example.

£.	s.	d.	£.	s.	d.
48	17	4	123	18	2
12	11	1	42	11	1
86	14	6	8	15	8
37	15	5	21	17	6
69	11	8	456	19	10
£255	10	0	£654	2	3

Note, The Farthings muſt be caſt up by four, and the Pence by twelve, the Shillings by twenty, and the Pounds by ten.——*Thus ſay*, 8 and 5 is 13, and 6 is 19, and 1 is 20, and 4 is 24; count how many Shillings in 24 Pence, which is 2 and 0 remains, obſerve to place it under Pence, and carry 2 to the Shillings; *then ſay*, 2 that I carry, and 11 is 13, and 15 is 28, and 14 is 42, and 11 is 53, and 17 is 70; count the twenties in 70, which is 3, and 10 remains, which muſt be ſet under the Shillings, and carry the three twenties to your Pounds; *again ſay*, 3 that I carry, and 9 is 12, and 7 is 19, and 6 is 25, and 2 is 27, and 8 is 35; count the tens in 35, which is 3 and 5 over; ſet down 5, and carry the 3 to your next number; then 3 and 6 is 9, and 3 is 12, and 8 is 20, and 1 is 21, and 4 is 25, which ſet down under, as ſhewn by the Example in the laſt page.

£.	*s.*	*d.*	£.	*s.*	*d.*
12	12	11½	48	10	4¼
34	14	10¾	27	19	8½
45	15	9	94	16	10
56	16	8¼	69	17	9¾
67	17	7¾	76	14	6½
78	18	6½	82	11	7
89	19	5½	51	12	5½
90	11	4	23	13	3¾
3	10	3¾	18	18	8¼
£.480	17	7½	£.494	15	3½

Queſtion. Add 20*l.* 10*s.* 10*d.* 14*l.* 15*s.* 4½*d.* 16*l.* 15*s.* 4¼*d.* and 19*l.* 17*s.* 6½*d.* together, and tell me what they all amount to?

Anſwer, 71*l.* 19*s.* 1¾*d.*

The

The TABLE *of* PENCE.

Pence			Pence		
20	is	1 - 8	90	is	7 - 6
24		2 - 0	96		8 - 0
30		2 - 6	100		8 - 4
36		3 - 0	108		9 - 0
40		3 - 4	110		9 - 2
48		4 - 0	120		10 - 0
50		4 - 2	130		10 - 10
60		5 - 0	132		11 - 0
70		5 - 10	140		11 - 8
72		6 - 0	144		12 - 0
80		6 - 8	150		12 - 6
84		7 - 0	156		13 - 0
614*d.*	=£	2 11 2	1476*d.*	=£	5 13 0

A *Table* of Old Roman Numbers.

L. ſignifies or ſtands for (50) fifty.
C. for (100) one hundred.
CC. (200) two hundred.
CCC. (300) three hundred.
CCCC. (400) four hundred.
D. (500) hundred, or thus IƆ.
DC. (600) ſix hundred, or thus IƆC.
DCC. (700) ſeven hundred, or thus IƆCC.
DCCC (800) eight hund. or thus IƆCCC.
DCCCC. (900) nine hund. or thus IƆCCCC.
M. (1000) one thouſand, or thus CIƆ.

The

The TABLE of PENCE,

In VERSE.

TWENTY-PENCE is One and Eight Pence,
This in Paper out I laid;
Thirty Pence is Two and Six Pence,
This I for a Grammar paid;
Forty Pence is Three and Four Pence,
This I ſpent in going to School;
Fifty Pence is Four and Two Pence,
And with this I bought a Rule.
Sixty Pence is juſt Five Shillings,
Maſter this for Entrance got;
Seventy Pence is Five and Ten Pence,
Who dare ſay that it is not?
Eighty Pence is Six and Eight Pence,
This is juſt a Lawyer's Fee;
Ninety Pence is Seven and Six Pence,
As you all may plainly ſee.
An Hundred Pence is Eight and Four Pence,
This I lent to Couſin Ben;
But as he wanted Nine and Two Pence,
I gave him the other Ten.
Yet had he wanted juſt Ten Shillings,
Then I muſt lent him Ten more;
I bid him take it and not plague me,
But never borrow as before.

	l.	*d.*	*s.*
Find the total Sum of Nineteen Pence Halfpenny			
Nineteen Groats and Half			
Seven and Thirty Shillings			
Half a Guinea			
Seven Half Crowns			
Three Half Crowns			
Two Piſtols, 17*s.* 6*d.* each			
Three Marks			
One Angel			
One Moidore and Half			
One Guinea			
Three Dollars, each 4*s.* 4*d.*			
One Moidore and a 36*s.* Piece			
One Hundred Crowns			
Fifty-one Eight-Pences			
Forty-two Three-Pences			
One Hundred Farthings and 2*d.*			
Sixty Groats and Six-Pence			
Forty-two Two-Pences			
Total,	£43	17	4½

* * *

Queſtion. If I borrow a ten Pound Bank Bill, twenty Guineas in Gold, thirty Half Crowns, and fifteen Shillings in Silver; what does the whole amount to?

Anſwer, £35 - 10 - 0

Glaſtonbury, Dec. 25th, 1786.

Robert Franklin, *Eſq.*

Bought of Henry Harrop.

15¼	Yards of Broad-cloth, at 7*s.* *per* yd.				
18⅛	Ditto of ditto, at 8*s.* 6*d.*	–			
24	Ditto of Knap, at 5*s.*	– –			
6	Ditto of Black Cloth, at 10*s.* 6*d.*				
7	Ditto of Light Knap, do. 5*s.* 6*d.*				
13½	Ditto of Blue Knap ditto, 5*s.* 3*d.*				
		Total,	£27	13	2¼

* * *

Bridgwater, Dec. 4th, 1786.

Mr. Benjamin French,

Bought of Edmund Broadrip,

			l.	*s.*	*d.*
16	Ells of Dowlas,	at 1*s.* 4*d.* *per* Ell,			
14	Ditto of Buckram,	1*s.* 3*d.* - - - -			
22½	Ditto Holland,	3*s.* 4*d.* - - - -			
1	Piece of Cambric,	4*l.* 19*s.* 11*d.*			
80½	Yards of Diaper,	at 1*s.* 10*d.* yd.			
19¾	Ditto of Damaſk	4*s.* 3*d.* - - - -			
2	Pieces of Muſlin,	at 18*s.* 10*d.* piece			
		Total,	£24	2	11¼

Taunton, Dec. 29th, 1786.

Mr. James White,

Bought of Thomas Andrews.

		l.	*s.*	*d.*
2	Flitches of Bacon, wt. 60lb. at 11*d.* *per* lb. - - - - - - - - - - - - - - - - -			
6	Firkins of Butter, 216lb. at 9½*d.*			
4	Cheſhire Cheeſe, 120lb. at 8*d.*			
4	Glouceſterſhire ditto, 40lb. at 7*d.*			
6	Suffolk ditto, 60lb. at 5*d.* - - - -			
	Total,	£17	14	4

Briſtol, Dec. 24th, 1786.

Mrs. Mary Marriot,

To Moſes Bromley, *Dr.*

	l.	*s.*	*d.*
Two Pounds of fine Hyſon Tea, at 16*s.* *per* lb. - - -			
Two ditto of Bloom, at 12*s.* –			
Two ditto of Green, 10*s.* –			
Four ditto of Souchong, 10*s.* 6*d.* –			
Three do. of Congou, 7*s.* –			
Total,	£6	19	0

TROY WEIGHT.

TROY WEIGHT is uſed in *Great-Britain* to weigh Gold, Silver, Pearls, and Jewels; and hath theſe Denominations, *(viz.)* Pounds, Ounces, Penny-Weights, and Grains.

TABLE.

32 Grains Natural of Wheat, *(Gr. Nt.)* or 24 grains Artificial, *(Gr.)* make one Penny-Weight.
20 Penny-Wights, *(Pwt.)* make one Ounce.
12 Ounces *(Oz.)* make one Pound *(lib.)*

Example.

lib.	*oz.*	*pwt.*	*gr.*
12	10	19	17
23	9	14	15
34	8	17	19
45	6	18	20
56	7	16	21
67	5	11	22
78	4	12	25
89	3	13	18
408	10	6	11

Bought of a Silverſmith as ſollows; one Silver Tankard. weighing 22 Ounces, at 7*s.* 6*d. per* Ounce; three large Table Spoons, 8 Ounces, at 8*s. per* Ounce; ſix Tea Spoons, 3 Ounces, at 7*s. per* Ounce; one Cream Mug, 3½ Ounces, at 6*s.* 10*d. per* Oz.; one Pint Saucepan, 10 Oz. at 7*s.* 2*d. per* Oz.—I demand the Weight, and what it all Coſt?

lb.	*oz.*	*pwt.*		*£.*	*s.*	*d.*
1	10	0	——			
0	8	0	——			
0	3	0	——			
0	3	10	——			
0	10	0	——			
3	10	10	*Anſ.*	£17	5	7

******

AVOIRDUPOISE WEIGHT.

WITH Avoirdupoiſe Weight is weighed, all Sorts of Grocery Wares, or Merchantdize, as Sugar, Pepper, Cloves, Ginger, *&c.* and with the Hund. Weight is weighed butter, Cheeſe, Fleſh, Tallow, Currants, Raiſons, Tobacco, Iron, Lead, Hay, *&c.* and hath theſe Denominations, *viz.* Tons, Hundreds, Quarters, Pounds, Ounces, and Drams.

TABLE

TABLE.

16 Drams	make	1 Ounce	(oz.)
16 Ounces	make	1 Pound	(lb.)
28 Pounds	make	1 Quarter	(Qr.)
4 Quarters	make	1 Hundred	(Cwt.)
20 Hundred	make	1 Ton	(Ton)

Example.

Tons	*Cwt.*	*Qr.*	*lb.*
124	17	1	14
45	14	2	17
8	18	1	16
22	16	1	27
431	19	2	18

lb.	*oz.*	*dr.*
18	10	11
42	11	10
21	13	12
45	14	11
87	12	13

Tons	*Cwt.*	*Qr.*	*lb.*	*oz.*	*dr.*
781	17	¼	19	11	12
68	11	½	18	12	13
6	10	¾	17	10	1
23	14	¾	10	15	14
876	19	½	21	14	15
90	17	½	27	12	11
9	16	¼	20	10	12
87	13	¼	10	9	8
781	11	½	9	8	7
2727	13	½	18	10	9

CLOTH MEASURE.

Cloth is meaſured with two Sorts of Meaſures, *viz.* a *Yard*, and an *Ell*, both divided into four Quarters, and each Quarter into four Nails, but the Nail of the Ell is 1-4th longer than the Nail of the Yard; whence it is that 20 Nails, or 5 Quarters, are contained in one Ell Engliſh.——The Flemiſh Ell is equivalent to 3-4ths of a Yard;—All Sorts of Cloth, both Linen, Woolen, Silks, Sattins, Stuffs, *&c.* in England, is meaſured by the above-mentioned Meaſures, or ſome of them.

TABLE.

4 Nails make one Quarter.
4 Quarters one Yard.
3 Quarters one Flemiſh Ell.
5 Quarters one Engliſh Ell.
6 Quarters one French Ell.

EXAMPLE.

Example.

Yds.	*Qr.*	*N.*
12	1	2
23	2	1
34	3	2
45	0	3
56	1	1
67	2	0
58	2	2
89	3	3
98	1	2
76	2	1
1	3	3
£555	1	0

Ells E.	*Qr.*	*Nll.*
44	4	3
33	1	2
22	2	1
11	3	2
17	4	3
24	3	2
56	1	1
78	2	2
87	3	3
61	0	2
90	4	1
£529	2	2

Ell Fl.	*Qr.*	*Nl.*
91	$\frac{1}{4}$	1
81	$\frac{1}{2}$	2
97	$\frac{1}{4}$	3
18	0	1
76	$\frac{1}{4}$	2
45	$\frac{1}{2}$	1
52	$\frac{1}{4}$	2
31	0	3
54	$\frac{1}{4}$	1
13	$\frac{1}{2}$	2
65	$\frac{1}{2}$	3
£530	$\frac{1}{2}$	2

Ell Fr.	*Qr.*	*Nl.*
47	1	2
89	2	3
76	3	1
61	1	2
95	4	3
54	5	1
28	4	2
12	3	3
3	4	2
30	3	3
28	5	3
£529	5	1

SUBSTRACTION.

SUBSTRACTION teacheth you how to ſubſtract, or take a leſſer Sum from a greater, or an Equal from an Equal, and to know what remains.

Rule.

Obſerve to place your greateſt Number firſt, and then the leſſer Number right under it, in ſuch order, that Units in the leſſer Number, may ſtand under the Units place of the greater, as more plainly appears by the following Example.

If £40 was borrowed, and £26 is paid, What remains unpaid?

40
26

Anſwer, £14
26

Proof, 40

Here ſay, 6 from 0 I cannot, but 6 from 10 and there remains 4, ſet down 4 in your Units place, and carry 1 for the 10 you added to your upper Number; *then ſay*, 1 that I carry and 2 is 3; 3 from 4 and there remains 1, which ſet down in your tenth place, and that will make 14, which is the Ballance due.

Secondly, To prove your Work, you muſt add your leſſer Number and remainder together, which if your Work is right, the Sum of the two Numbers added together, will be equal to your greater Number.

N. B. When any Figure in your leſſer Number be more than the Figure in the greater Number, always obſerve to add *(if in Money)* 4 to the Farthings Place, 12 to the Pence, 20 to the Shillings, and 10 to the Pounds, and ſo accordingly in other Rules.

Example.

From	87654	12345
Take	29823	9876
Remains	57831	2469
Proof	87654	12345

From

	l.	*s.*	*d.*	*l.*	*s.*	*d.*
From	47 –	11 –	8	171 –	8 –	0
Take	39 –	17 –	9¼	99 –	19 –	9½
Remains	7 –	13 –	10¾	71 –	8 –	2½
Proof	47 –	11 –	8	171 –	8 –	0

	Tons	*Cwt.*	*Qr.*	*lb.*	*lb.*	*oz.*	*dr.*
From	48 –	11 –	1 –	16	87		
Take	39 –	18 –	2 –	17	82 –	11 –	13
Remains	8 –	12 –	2 –	27	4 –	4 –	3

lib.	*oz.*	*pwt.*	*gr.*	*lib.*			
47 –	11 –	12 –	13	87			
29 –	10 –	13 –	21	68 –	6 –	10 –	12
17 –	0 –	18 –	16	18 –	5 –	9 –	12

	Yds.	*Qr.*	*Nl.*	*Yds.*	*Qr.*	*N,.*
From	87	1 –	2	61 –	1 –	0
Subſtr.	69 –	2 –	3	52 –	3 –	2
Rem.	17 –	2 –	3	8 –	1 –	2

	Ell Fl.	*Qr.*	*Nl.*	*Ell* E.	*Qr.*	*Nl.*
From	82	1	3	45	2	3
Take	63	2	2	39	1	3
Remains	18	2	1	6	1	0

	Ells E.	*Qr.*	*Nl.*	*Ells* Fr.	*Qr.*	*Nl.*
From	92	4	3	74	3	2
Subſtr.	89	4	3	64	4	3
Rem.						

Bought Four Hundred and Half Weight, of Jamaica Sugar

Sold at ſundry Times,	8 *Cwt.*			
	2	$\frac{1}{4}$		
	1	$\frac{1}{4}$	9	
		$\frac{1}{2}$	21	6
	12	3	2	6
What remains unſold? *Anſwer,*	1	$\frac{1}{2}$	25	10

From 20 Nobles ſubſtract 60 Groats.

l.	*s.*	*d.*
6	13	4
1	0	0

From 31¾ Tons, and ¾ of an Ounce, ſubſtract 27½ Pounds.

Tons	Cwt.	Qr.	lb.	oz.	dr.
31	15	0	0	0	12
			27	8	

Lent 144 Pounds 11 Shillings.

	l.	s.	d.
Received at different Times	87	11	0
	9	19	2
	6	12	4
	£		
Remains due,	£		

What Sum of Money is that which muſt be added to three Score and fifteen Million Pounds, nineteen Shillings and four Pence, to make it two Hundred Thouſand Thouſand Pounds ?

	£.	s.	d.
	200000000	0	0
	75000000	19	4
£			

A Snail, in climbing up a May-Pole, 69½ Feet high, was obſerved to climb 9 Feet 6 Inches every Day, and at Night he came down 3 Feet 9 Inches; I demand in how many Days he reached the Top of the Pole, and his laſt Day's Journey.

	Feet.		Inches.
	9	-	6
	3	-	9
1ſt. Day's Journey,	5	-	9
	9	-	6
	15	-	3
	3	-	9
2d. Day's Journey,	11	-	6
	9	-	6
	21	-	0
	3	-	9
3d. Day's Journey,	17	-	3
	9	-	6
	26	-	9
	3	-	9
4th Day's Journey,	23	-	0
	9	-	6
	32	-	6
	3	-	9

	Feet.	Inches.
5th Day's Journey,	28	9
	9	6
	38	3
	3	9
6th Day's Journey,	34	6
	9	6
	44	0
	3	9
7th Day's Journey,	40	3
	9	6
	49	9
	3	9
8th Day's Journey,	46	0
	9	6
	55	6
	3	9
9th Day's Journey,	51	9
	9	6
	61	3
	3	9

10th

	Feet.	Inches.
10th Day's Journey,	57	6
	9	6
	67	0
	3	9
11th Day's Journey,	63	3
From	69	6
Take	63	3
12th Day's Journey,	6	3

Anſwer, In 12 Days, and 6 Feet 3 Inches was his laſt Day's Journey.

Bought 2 Caſks of Sugar, the weight of one is 1 Hundred 2 Quarters, the other 1 Hundred and 18 Pounds; Tare of the firſt was 25 Pound, and the other 1 Quarter and 7 Pounds:—What is the Weight of the Sugar in both Caſks?

	Cwt.	*Qr.*	*lb.*
	1	2	0
	1	0	18
Anſ.	2	0	14

MULTIPLICATION.

MULTIPLICATION ſerves inſtead of many Additions; there are three Terms belonging to this Rule, *firſt* the Multiplicand, or Sum to be multiplied; *ſecondly*, the Multiplier, or Sum by which you Multiply; *thirdly*, the Product, or Sum produced.

Rule.

To learn the following Table perfectly, begin at the upper Corner of the left Hand Side, *ſay*, twice 2 is 4, 3 times 2 is 6, 4 times 2 is 8, 5 times 2 is 10, 6 times 2 is 12, 7 times 2 is 14, 8 times 2 is 16, 9 times 2 is 18, 10 times 2 is 20, 11 times 2 is 22, and 12 times 2 is 24.

Then ſay, 3 times 3 is 9, 3 times 4 is 12, three times 5 is 15, and ſo on till you have got the Table perfectly by Art.

The TABLE of MULTIPLICATION.

2 Times	2	is	4
	3		6
	4		8
	5		10
	6		12
	7		14
	8		16
	9		18
	10		20
	11		22
	12		24
3 Times	3	is	9
	4		12
	5		15
	6		18
	7		21
	8		24
	9		27
	10		30
	11		33
	12		36
4 Times	4	is	16
	5		20
	6		24
	7		28
4 Times	8	is	32
	9		36
	10		40
	11		44
	12		48
5 Times	5	is	25
	6		30
	7		35
	8		40
	9		45
	10		50
	11		55
	12		60
6 Times	6	is	36
	7		42
	8		48
	9		54
	10		60
	11		66
	12		72
7 Times	7	is	49
	8		56
	9		63
7 Times	10	is	70
	11		77
	12		84
8 Times	8	is	64
	9		72
	10		80
	11		88
	12		96
9 Times	9	is	81
	10		90
	11		99
	12		108
10 Times	10	is	100
	11		110
	12		120
11 Times	11	is	121
	12		132

12 Times 12
is 144.

Examination.

Queſtion. If 3 times 7 be 21, what is 7 times 3?
Anſwer, 21.

If 6 times 9 be 54, What is 9 times 6?
Anſ.

If 3 times 11 be 33, What is 11 times 3?
Anſ.

If 8 times 12 be 96, What is 12 times 8?
Anſ.

What is the difference between 144, and the ſquare of 12?
Anſ.

Note, the ſquare of any Number is that Number multiplied by it ſelf.

Example.

Multiplicand	1432	4	
Multiplier	4	4 × 1	Proof.
		4	
Product	5728		

Rule.

******

Rule.

Say, 4 times 2 is 8, which place under your Multiplier; *then ſay*, 4 times 3 is 12, ſet down 2 and carry 1 to your next figure, for the 10 you abated in the 12; *again ſay*, 4 times 4 is 16, and 1 that I carry is 17, ſet down 7, and carry 1 to your next figure; *laſtly*, 4 times 1 is 4, and 1 that I carry is 5, which ſet down in your next place, as ſhewn by the above Example.

* * *

To Prove the Work.

MULTIPLICATION is proved by caſting off, or leaving out all the Nines.—*Firſt* find how many Nines there are in the Multiplicand, and ſet down the remainder (if any) on the right hand ſide of a Croſs, (thus ×); alſo caſt off the Nines in your Multiplier, and ſet down the remainder on the left hand ſide of the Croſs; then multiply theſe two Figures together, and the remainder, after caſting off the Nines, muſt be ſet on the Top; *laſtly*, caſt off the Nines in the Product, and the remainder ſet at the Bottom, which if it agree with the Figure on the Top, the Work is ſuppoſed to be right. *See the Example.*

The MULTIPLICATION *Table*

IN VERSE.

THREE 3's is 9, three 4's is 12,
  Three 5's is 15 ſure;
And 3 times 6 is juſt 18,
  And wants 2 of a Score.
Seven times 3 is 21,
  Three 8's is 24,
And 3 times 9 is 27,
  Indeed it is no more.
Four 4's were 16 pretty girls,
  Who lived near HIDE-PARK;
And 4 times 5 were 20 Blades,
  Who met them in the dark
And 4 times 6 were 24,
  Of Women old and grey;
And 4 times 7 were 28,
  Of Maids that went aſtray.
Now 4 times 8 is 32,
  Four 9's is 36,
And 5 times 5 were 25,
  Inclin'd to knaviſh tricks;
And 5 times 6 were 30 boys,
  Who loſt their time at play,
And 5 times 7 were 35,
  Of farmers cloath'd in grey.
So 5 times 8 were 40 SCOTS,
  Who came from *Aberdeen*;
And 5 times 9 were 45*,
  Which gave them all the ſpleen.

---

* The North Briton, No. 45.

And 6 times 6 were 36,
  Fine ladies all in blue;
And all muſt own that 7 times 6,
  Will make but 42.
Well, 6 times 8 is 48,
  Of famous Briſtol dames,
And 6 times 9 were 54;
  Who went by different names.
And 7 times 7 is 49,
  Stout Sailors, bold and true;
And 7 times 8 were 56,
  Belonging to the Crew.
Seven times 9 is 63,
  According to this Rule;
And 8 times 8 were 64,
  Who ſtaid away from School.
Yes! 8 times 9 were 72,
  That from it would not ſtay;
And 9 times 9 were 81,
  Who did not like to play.
So now brave boys, with cheerful mind,
  Let ev'ry one take care,
To Add, Subſtract, and Multiply,
  And the Dividend to ſhare.
The Quotient properly to place,
  And give each man his due;
Which, by the Diviſor multiply'd,
  Will prove if all is true.

* * *

Example.

Example.

Mult.	144	0	246	3
	8	8×0	10	10×3
		0		3
	1152		2460	

Multiply 678902
by 12

Anſwer, 8146824

Multiply 1879076
by 9876

11274456
13153532
15032608
16911684

Anſwer, 18557754576

Multiply 21242
14

297388

What's the Square or Product of 1781?

```
   1781
 14248
30277
-------
3171961
-------
```

Multiply 40, 20, 10, 8, 16, and 47 together

```
      20
     ---
     800
     ---
      10
    ----
    8000
       8
   -----
   64000
      16
 -------
 1024000
      47
 -------
 7168000
4096000
--------
48128000
--------
```

Multiply 17 - 8 - 11 - 12 by 109

Anſ. 1930 - 10 - 13 - 12

9876543210
123456789

88888888890
79012345680
69135802470
59259259260
49382716050
39506172840
29629630
19758046420
9876543210

1219375811126352690

	Tons	*Cwt.*	*Qr.*	*lb.*	*oz.*	*dr.*		
Mul.	1 -	6 -	2 -	10 -	12 -	14,	by	6968
						10		
	13 -	5 -	3 -	24 -	0 -	12		
						10		
	132 -	19 -	2 -	16 -	7 -	8		
						10		
	1329 -	16 -	1 -	24 -	11 -	0		
						6		
	7978 -	18 -	3 -	8 -	2	0	=	6000
	1196 -	16 -	3 -	8 -	3	8	=	900
	79 -	15 -	3 -	4 -	4	8	=	60
	10 -	12 -	3 -	2 -	7	0	=	8
	9266 -	4 -	0 -	23 -	1	0		6968

ABREVIATIONS.

Rule I.

When either your Multiplicand, or Multiplier, or either of them, having a Cypher, or Cyphers, on the right hand, ſet down as many Cyphers as there are Cyphers in the Multiplicand and Multiplier, and multiply by the ſignificant Figures only.

Example.

$$\begin{array}{r} 124800 \\ 1000 \\ \hline 12480000 \\ \hline \end{array} \qquad \begin{array}{r} 242000 \\ 1200 \\ \hline 2904000 \\ \hline \end{array}$$

Rule II.

When your Multiplier conſiſt of three Figures, either with or without Cyphers, and the third Figure not above three, you may with eaſe perform it by the Directions as follows:

Firſt, If the third Figure in your Multiplier be 1, multiply by your two firſt Figures, adding to the Product your Multiplicand, in ſuch order, as if multiplied ſeperately, and that Product is your Anſwer.

Secondly, If the third Figure in your Multiplier be 2, proceed as above, only obſerve to double the Figures in your Multiplicand.

Thirdly, If the third Figure in your Multiplier be 3, you muſt treble the Figures in your Multiplicand; as more plainly appears by the following Examples.

```
    2826          1486
     112           111
  ------        ------
  316512        164946
  ------        ------
```

The Same by the common Way of Working.

```
    2826          1486
     112           111
  ------        ------
    5652          1486
   2826          1486
  2826          1486
  ------        ------
  316512        164946
  ------        ------
```

Mult. 1234567 by 1209

Anſwer, 142591503

```
      48060              23450
       2120               3100
-----------------   -----------------
  101887200           72695000
-----------------   -----------------

                    246280
                   1214012
             ---------------
                   2955360
               344792000
             2955360
 8           ---------------
2×4          298986875360
 8           ---------------
```

The Same by the common Method of Working.

```
                    246280
                   1214012
                ------------
                    492560
                   246280
                 985120 0
               246280
             492560
            246280
           ---------------
           298986875360
           ---------------
```

Note,

Note, When you have Fraction Parts, either in your Multiplicand or Multiplier, proceed as follows: If your Fraction is in your Multiplier, take ſuch Parts as your Fraction contains from your Multiplicand; add all the Work together, and it will give the Anſwer.

Rule.

If the Fraction Part be an half, and is ſet in the Multiplier, take half of your Multiplicand, after Working with your whole Numbers by the common Rule, and add the Produce together.

If both your Numbers have Fractions, take ſuch Fraction Parts from each Number, as before deſcribed, which more plainly appears by the following Examples.

☞ Obſerve to proceed with the Fraction Parts from your left hand, *thus*, the half of 14 is 7, &c.

Example.

$$\begin{array}{r} 144\phantom{\frac{1}{2}} \\ 12\frac{1}{2} \\ \hline 1728\phantom{\frac{1}{2}} \\ 72\phantom{\frac{1}{2}} \\ \hline 1800\phantom{\frac{1}{2}} \\ \hline \end{array}$$

$$\begin{array}{r} 120421\frac{1}{2} \\ 11010\phantom{\frac{1}{2}} \\ \hline 1204210\phantom{\frac{1}{2}} \\ 13246310\phantom{000\frac{1}{2}} \\ 5505\phantom{\frac{1}{2}} \\ \hline 1321840715\phantom{\frac{1}{2}} \\ \hline \end{array}$$

Mult. 1860 by $1218\frac{1}{4}$
$1218\frac{1}{4}$

33480
22320
465

2265945

The common Way of Working.

Mult. 1860
$1218\frac{1}{4}$

14880
1860
3720
1860
465

2265945

$12452\frac{1}{2}$
$120\frac{1}{2}$

1494240
6226
60

1500526

Multiply 12345
by 468 $\frac{1}{2}$

98760
74070
49380
6172 $\frac{1}{2}$

Anſ. 5783632 $\frac{1}{2}$

Queſtion. Multiply 143 $\frac{1}{2}$ Cwt. by 18
Anſwer, 2664

Mult. 2860 $\frac{1}{4}$ by 12 $\frac{3}{4}$
Anſ. 36468

Mult. 1681 $\frac{1}{4}$ by 14
Anſ. 17547 $\frac{1}{2}$

Having ſet a Number of Examples, not only in the ſhorteſt and eaſieſt Method, but have alſo ſtated at large the Queſtions according to the general Cuſtom and Manner of Teaching; whereby every one of the weakeſt Underſtanding, may be able to perform, with the greateſt Eaſe, and with leſs than one-third of the Figures, in the Working of any Sum or Queſtion ever yet publiſhed; whereas it is evident to every one who has the ſmalleſt Judgment of Figures, muſt confeſs, that in a multiplicity of Figures, there is the greateſt Danger of Errors, beſides the Embarraſment that a Scholar labours under.

Compound

Compound MULTIPLICATION.

	l.	*s.*	*d.*		*l.*	*s.*	*d.*
Mult.	1 –	10 –	4		4 –	8 –	2 $\frac{1}{2}$
by			4	by			8
	£6 –	1 –	4		35 –	5 –	8

	l.	*s.*	*d.*
Mult.	14 –	17 –	8
by			12
	£178 –	12 –	0

	l.	*s.*	*d.*	
Mult.	12 –	13 –	7$\frac{3}{4}$	by 144
			12	
	152 –	3 –	9	
			12 × 12 = 144	
	1826 –	5 –	0	

Mult.	1*l.* –	10*s.* –	10$\frac{1}{2}$*d.*
			9
	13*l.* –	17*s.* –	10$\frac{1}{2}$

Queſtions.

1ſt. What Sum of Money muſt be divided between 16 Men, ſo that each Man may receive 8*s.* 4*d.* *Anſwer,* 35*l.* 5*s.* 8*d.*

Rule.

When your given Number is more than 12, find two ſuch Numbers, that if multiplied together, their Product may be equal to the given Number; Thus, 4 × 4 = 16, that is 4 multiplied by 4, is equal to 16; but if your given Number ſhould be ſuch, that no two Multipliers can be made equal to it, (which ſome times is the caſe) ſeek ſuch Numbers as will be neareſt to that Number; then multiply your Sum by the Number of Figures that is wanting in your Multipliers, to make them equal to your given Number; add all the Products together, and it will give the Anſwer.

See the following Example.

	l.	*s.*	*d.*	
Mult.	18	18	9	by 112
				11 × 10 + 2 = 112
	208	6	3	
			10	
	2083	2	6	
	37	17	6	
	2121	0	0	

2d. Multiply 2*l.* – 14*s.* – 6*d.* by 111?
Anſwer, 299*l.* – 15*s.* – 0*d.*

3d. What muſt I pay for 112 *lb.* at 8½*d. per* Pound?
Anſ. 7*l.* – 15*s.* – 10*d.*

4th. What is the pay of 100 Workmen, each having 2*s.* 8*d. per* Day?
Anſ. 13*l.* – 6*s.* – 8*d.*

5th. What Coſt 24 Yards Holland, at 2*s.* 8*d. per* Yard?
Anſ. 3*l.* – 4*s.* – 0*d.*

Mult. 13*l.* – 12*s.* – 11¾*d.* by 81
Anſ. 1105*l* – 11*s.* – 3¾*d.*

lb. *oz.* *pwt.* *dr.*
Mult. 17 – 8 – 11 – 12 by 109
Anſ. 1930 – 10 – 13 – 12

Tons *Cwt.* *Qr.* *lb.* *oz.*
Mult. 17 – 6 – 0 – 14 – 11 by 41
Anſ. 709 – 11 – 1 – 14 – 3

What's the Amount of 13¾ Score of Beef, at 3*s.* 9*d. per* Score?
Anſ. 2*l.* – 11*s.* – 6¾*d.*

What Coſt 135 Gallons of Brandy, at 7*s.* 5*d. per* Gallon?
Anſ. 50*l.* 1*s.* 5*d.*

29½*lb.* of Tea, at 18*s.* 6½*d.* *per* Pound.
Anſ. 27*l.* 6*s.* 11½*d.*

57*lb.* of Nutmegs, at 7*s.* 2¾*d.* *per* Pound.
Anſ. 20*l.* 12*s.* 0¼*d.*

87¾ Buſhels of Wheat, at 4*s.* 3*d.* *per* Buſhel?
Anſ. 8*l.* – 12*s.* – 11¼

Multiply 3½*d.* by 119456

10

2 – 11
10

1 – 9 – 2
10

14 – 11 – 8
10

145 – 16 – 8
10

1458 – 6 – 8 = 1 0 0 0 0 0
145 – 16 – 8 = 1 0 0 0 0
131 – 5 – 0 = 9 0 0 0
5 – 16 – 8 = 4 0 0
14 – 7 = 5 0
1 – 4 = 6

Anſ. 1742 – 1 – 4 1 1 9 4 5 6

DIVISION.

DIVISION.

DIVISION teacheth you how to divide a Number into any Number of equal Parts.—There are four Terms belonging to Diviſion; *firſt*, the Dividend, or Sum to be divided; *ſecondly*, the Diviſor, or Sum, by which you divide; *thirdly*, the Quotient, or Sum quoted; *fourthly*, the Remainder, which is, or ought always to be, leſs than the Diviſor.

Rule I.

Firſt, Find how many Times the Diviſor is contained in the Dividend; *thus*, How many 4's in 8? which is twice, ſet down 2 under the 8; then find how many 4's in 2, the next Figure in your Dividend, which cannot be any, therefore ſet a 0 under the 2 in your Dividend; *again*, find how many 4's in 20, which is 5, for 5 × 4 = 20, ſet down 5 under the 0 in your Dividend; *laſtly*, find how many Times 4 in 2, which is 0, and 2 the Remainder; ſet down the 2 on the right Hand Side of the Dividend, behind a crooked ſtroke, [thus ( ]

Secondly,

Secondly, To prove your Work, multiply the Quotient by the Diviſor, adding to that Product the Remainder, if any, and that Product, if your Work be true, will be equal to the Dividend, as plainly appears by the following Example.

Diviſor. Dividend. Remaind.
4) 8 2 0 2 (2 6) 7 2 6 1 2 (
2 0 5 0 Quotient. 1 2 1 0 2

8) 4 6 7 8 9 (5 12) 8 7 6 5 4 (6
5 8 4 8 7 3 0 4
8 12
4 6 7 8 9 Proof 8 7 6 5 4

79) 6 1 0 1 3 4 2 (——— 7 7 2 3 2 $\frac{14}{79}$
5 7 1 7 9
1 8 3
2 5 4 6 9 5 0 9 2
1 7 2 5 4 0 6 2 5
1 4 Proof 6 1 0 1 3 4 2

10) 1 2 4 6 8 (8 11) 8 1 4 2 6 (4
1 2 4 6 7 4 0 2

```
9)1761413207(195712578 5/9
  9
  --
  86
  81
  ---
   51
   45
   ---
    64
    63
    ---
     11
      9
     ---
      23
      18
      ---
       52
       43
       ---
        70
        63
        ---
         77
         72
         ---
          5
          ---
```

Or thus:

```
9)1761413207
  ----------
   195712578
  ----------
```

Rule II.

When it is required to divide a given Number by a Diviſor, conſiſting of two, three, four, or more Figures, ſee how many Times the Diviſor is contained in the Dividend, ſo that the Remainder may be leſs than the Diviſor; *as for Example*, let 9345222, be divided by 46; firſt find how many Times your Diviſor 46, are contained in 93, the two firſt Figures in your Dividend, which you will find to be twice, then multiply your Diviſor by the Figure in the Quotient, which is contained by the Diviſor, and ſubſtract that Product from the Figures of your Dividend; always adding ſo many tens to your upper Number to make him equal, or more than the lower Number: *thus ſay*, twice 6 is 12; 12 from 3 I cannot, but 12 from 13, and there remains 1, which ſet down under the Figure in your Dividend, and carry 1 for the 10 that was added to the 3; *then ſay*, twice 4 is 8, and 1 that I carry is 9, 9 from 9 and there remains 0; then take down the next Figure in your Dividend, which is 4, and place it on the right hand of the Remainder 1, and it will make 14; then aſk how many Times 46 in 14, which is 0, place your 0 on the right hand of the 2 in your Quotient; then take your next Figure in the Dividend in the ſame manner as the laſt, and it will make 145: again find how many Times the Diviſor 46, are contained in 145, which is 3, place 3 up in your Quotient, and proceed *thus:* 3 Times 6 is 18, 18 from 25 and there remains 7, which place right under the 5, and carry

2 for the 20 added to the 5; *then ſay*, 3 Times 4 is 12, and 2 is 14, 14 from 14 and there remains 0; take down the next Figure 2, and it will make 72, find how often 46 in 72, which is 1, place 1 in the Quotient, as before directed; *then ſay*, once 6 from 12 and there remains 6, ſet down the 6 under the 2; and ſay, once 4, and 1 that I carry is 5, 5 from 7 and there remains 2; take down the next Figure 2, and it will make 262; then find how often 46 in 262, which is 5 Times; *ſay*, 5 Times 6 is 30, 30 from 32, and there remains 2; and 5 Times 4 is 20, and 3 is 23, 23 from 26 and there remains 3: *laſtly*, take down your other 2, and it will make 322, find how many 46's in 322, which is 7; *then ſay*, 7 times 6 is 42, 42 from 42 there remains 0, and 7 Times 4 is 28, and 4 is 32, 32 from 32, and there remains 0, which is your Anſwer ſought.

Diviſor. Dividend. Quotient.
46)9345222(203157
145
72
262
322

Note, The above Method being quite different from the common Practice of Teaching, I doubt not but it will be a little difficult and ſtrange to the Learner, that have been taught and inſtructed in the former Way of Diviſion; yet I flatter myſelf to ſay, that by having the foregoing Rules perfectly by Art, (which you ought always to have before you proceed further) you will be able to perform auy *Queſtion* in this Rule, with much more Eaſe, and in one-third of the Time it will require to Work the Same by the common Way.

See the following Example.

The Common Way of Working.

```
46)9345222(203157
   92
   ---
    145
    138
    ----
      72
      46
      ----
      262
      230
      ----
       322
       322
       ---
       000
```

365)456820(1251
918
1882
570
205

1234)4523611(366
8216
8121
717

14076) 19874617114759 87 (141195063333
57986
16821
27457
133811
71271
8914
89147
46915
46879
46518
42907
679

123456789) 9876543211123456789 (
912345678
481481559

Remainder 111111192

Anſwer 8000000073

45060708) 490147654321987*l.* – 17*s.* – 9$\frac{1}{2}$
395405743
350200792
347758361
323334059
413091227 8
253659067

28355527
20

45060708) 567110557 (12
116503477
26382061
12

45060708) 316584741 (7

1159785

Anſ. 10877495*l.* – 12*s.* 7*d.* $\frac{1159785}{45060708}$

Divide one Hundred twenty-three Thouſand, four Hundred, fifty-ſix Million of Millions, ſeven Hundred eighty-nine Thouſand, fifty-ſeven Million, one Hundred twenty-ſeven Thouſand, ſeven Hundred Pounds, ſeventeen Shillings, and Sixpence Halfpenny, equally between 987654321 Men, and tell me each Man's Part to 987654321 Part of a Farthing?

Anſ. 124999998*l.* – 18*s.* – $4\frac{1}{2}$*d.*

* * *

Compound DIVISION.

Rule.

Find two Numbers, that when multiplied together, their Product ſhall be equal to the given Diviſor; as in the following Example.

Divide 1 2 4 8 1 2 by 36; *thus*, 6 × 6 = 36
6)―――――――――
2 0 8 0 2
6)――――――――
3 4 6 7

Divide 6028 by 77; 11 × 7 = 77
11)
548
7)
$78\frac{2}{7}$

Divide 18*l.* – 14*s.* by 14
14)
1*l.* – 6*s.* – $8\frac{1}{2}$*d.* $\frac{12}{14}$

Divide 891*l.* – 11*s.* – 11*d.* by 77
11)
81 – 1 – 1
7)
11 – 7 – $0\frac{4}{7}$

Tons. *Cwt.*
Divide 114 – 19 by 56
8)
14 – 7 – 1 – 14
7)
2 – 1 – 0 – 6

Queſtions.

Queſtions.

Divide 148*l.* – 13*s.* – 4*d.* by 8
Anſ. 18*l.* – 11*s.* – 8*d.*

Divide 719*l.* – 16*s.* – $4\frac{1}{4}$*d.* by 12
Anſ. 59*l.* – 19*s.* – $8\frac{1}{4}$*d.*

Divide 20*l.* between ſix old Women, and tell me the Share of each Woman?
Anſ. 3*l.* 6*s.* 8*d.*

Divide ſix Hundred and Half of Cheeſe between five Poor Families?

	Cwt.	*qr.*	*lb.*	*oz.*	*dr.*
Anſ.	1	1	5	9	$9\frac{3}{5}$

Divide 6 Pieces of Cloth, each Piece 42 Yards, between 36 Soldiers, and tell me how much each Man will have?
Anſwer, 7 Yards.

If a Man has 190*l.* *per Annum,* What is his Weekly Income?
Anſ. 3*l.* – 13*s.* – 3*d.* $\frac{12}{52}$

The Clothing of 36 Poor People, amounting to 50 Guineas, I deſire to know the Expence of each ſeperately.
Anſ. 1*l.* 9*s.* 2*d.*

Divide 1123 Cwt. exactly between 14 Thouſand 3 Hundred 36 Men?

	qr.		lb.		oz.		dr.
Anſ.	3	-	3	-	12	-	14

Divide 2144 Marbles between 48 School-Boys, and tell me each Lad's Share?

Anſ. 44 $\frac{4}{6}$ or $\frac{2}{3}$

If 10*l.* be diſtributed amongſt Men, Women and Children, ſo that the Men may have 14*d.* the Women 10*d.* and the Children 5*d.* each.—*Query*, The Number of Men, Women and Children, and how much each Perſon muſt receive for his Share, ſuppoſing the Remainder, if any, be given to the Diſtributer.

Anſ. 82 Perſons of each Denomination.

		l.		*s.*		*d.*
The Men to have		4	-	15	-	8
Women	—	3	-	8	-	4
Children	—	1	-	14	-	2
Diſtributer	—	0	-	1	-	10
		£10	-	0	-	0

⁂

REDUC-

REDUCTION.

REDUCTION teacheth you to reduce Numbers of greater Denominations, whether Money, Weight, Meaſure, Time, Motion, &c. into ſmaller Sums; and the contrary are, from one Denomination to another, diſcovering the ſame Value in different Terms.

On REDUCTION.

REDUCTION ſhews how we of Names in Uſe,
From Great to Small, and Small to Great reduce;
So that the Anſwer which ſhall then ariſe,
The given Sum in Value requlize:
Multiply or Divide it back again you muſt,
Which make again your given Number juſt.

TABLE I.

960	Farthings	make £1 Sterling.
480	Halfpence	
240	Pence	
120	Two-pences	
80	Three-pences	
60	Groats	
40	Six-pences	
30	Eight-pences	
20	Shillings	
12	Twenty-pences	
8	Half Crowns	
4	Crowns	
3	Nobles	
2	Angels	

TABLE II.

1	Half Crown	2*s.* 6*d.*	=	–	or	30 Pence
1	Crown –	5*s.* 0*d.*	=	15	Groats,	60 ditto
1	Noble –	6*s.* 8*d.*	=	20	Groats,	80 ditto
1	Angel –	10*s.* 0*d.*	=	30	Groats,	120 ditto
1	Mark –	13*s.* 4*d.*	=	40	Groats,	160 ditto
1	Guinea –	21*s.* 0*d.*	=	63	Groats,	252 ditto

TABLE III.

One Crown, (*French*,) Value	0	4	6
One Livre, *ditto*, —	0	1	4½
One Dollar, (*Spaniſh*,) —	0	4	6
One Piece of Eight, *ditto*,	0	4	6
Mexico, *ditto*, —	0	4	4½
One Lion Dollar, (*Holland*,)	0	4	7
One Croſs ditto, *ditto*, —	0	4	2
Rix Dollar, *ditto*, — —	0	4	4½
One Ducat, *ditto*, — —	0	9	3
One Ducatoon, *ditto*, —	0	6	3
One Dollar, (*Flanders*,) —	0	4	6
One Rix Dollar, *ditto*, —	0	4	6
One Pound, *ditto*, — —	1	13	4
One Mill-Ree, (*Portugal*,)	0	6	9
One Florin, (*Palermo*,) —	0	1	3
One Bitt, (*Jamaica*,) — —	0	0	7½
One Ducat, (*Poland*,) —	0	4	6¼
One Ruble, (*Muſcovy*,) —	0	4	6

Rule.

Firſt, All great Names are turned into leſſer by multiplying by as many of the leſſer as make one of the greater.—And all ſmall Names are turned into greater, by dividing by as many of the leſſer as make one of the greater.

How many Farthings are contained in three Pounds Sterling?

£3
20

60
12

720
4

Anſwer, 2880

How many Six-pences, Three-pences, and Pence, in 144*l.* – 17*s.*?

20

2897
2

5794 Six-pences.
2

11588 Three-pences.
3

34764 Pence.

In 21168 Farthings, How many Guineas?
Anſwer, 21 Guineas.

In 48*l.* – 11*s.* 6*d.* How many Farthings?

20
971
12
11658
4
46632 Anſwer.

How many Three-pences in 2140 Guineas?

2 1 4 0
8 4
8 5 6 0
1 2 0
Anſwer, 1 7 9 7 6 0

How many Six-pences, Half Crowns, and Pounds, in 6000 Three-pences?

2) 6 0 0 0
5) 3 0 0 0 Six-pences.
Anſwer, 8) 6 0 0 Half Crowns.
7 5 Pounds.

In 21424 Farthings, how many Crowns, Half Crowns, Shillings and Pence, and of each an equal Number?

60
30
12
1

103

4)21424

103)5356(52
206

Anſwer, 52

How many Crowns and Pounds Sterling, in 17284 French Crowns?

17284
9

10)155556

4)15555(6

3888(3

Anſwer, { 15555 Crowns, and 3*s.*
3888 Pounds, 15*s.*

In 83927 Mexico Pieces of Eights, How many Pounds Sterling?

Anſwer, 18359*l.* $7\frac{1}{2}$*d.*

In 675 Marks, How many Guineas?

```
          675
           40
  63)  ————————(428
       27000
        180
         540
       ——————
       3)36
       ——————
          12
       ——————
```

Anſwer, 428 Guineas, 12 Shillings.

Or thus,

```
          675
          160
      ————————
      40500
      675
 252)————————(428
    108000
      720
     2160
    ——————
      144
    ——————
```

In 89573 Piſtoles, How many Dollars?

Anſwer, 348339 Dollars, 2*s.* or $\frac{24}{54}$

In 76543 Bitts of Jamaica, How many Pounds Sterling?

Anſwer, 2391*l.* 19*s.* $4\frac{1}{2}$*d.*

In 1600 Moidores, How many Thirteen-pence Halfpennys, Half Crowns, Crowns, Half Guineas, and of each an equal Number?

Anſwer, $2258\frac{378}{459}$

Reduce 240 Venetian Ducats de Banco into Sterling Money, the Exchange at 4*s.* 6*d.* *per* Duc.

Anſwer, 54*l.* Sterling.

In 1008 Mill-Rees of Portugal, each 5*s.* 3*d.* 9005 Cruſadoes, each 400 Rees, (1000 Rees to a Mill-Ree,) at 5*s.* 6*d.* *Sterling*; 89007 Spaniſh Dollars, each 4*s.* 3*d.* and 9060 French Crowns, each 4*s.* 6*d.* How many Pounds Sterling?

Anſwer, 22207*l.* 10*s.* 9*d.*

Bring 296 Dollars, at Fifty-two Pence 6-8ths Sterling, into Pounds Sterling?

Anſwer 65*l.* 1*s.* 2*d.*

A certain rich Man had 6 Villages, every Village 4 Streets, every Street 40 Houſes, every Houſe 6 Rooms, every Room 2 Bureaus, every Bureau 24 Drawers, every Drawer 2 Purſes of Gold, each Purſe containing 200 Guineas;—I demand how many Pounds, Shillings, Pence and Farthings?

Anſwer,
116121600 Pounds.
2322432000 Shillings.
27869184000 Pence.
111476736000 Farthings.

In as many Six-pences as there are Days in the Year, How many Pounds Sterling.

Anſwer, 9*l.* 2*s.* 6*d.*

How many Groats doth 100 Guineas contain?

Anſwer, 6300.

* * *

TROY WEIGHT.

Bought 7 Ingots of Silver, each containing 23*lb.* 5*oz.* 7*pwt.* how many *gr.*

```
          23lb. 7oz. 7pwt.
                12
          ------------
               281
                20
         -------------
              5627
                24
         -------------
             22508
            11254
         -------------
            135048
                 7
         -------------
            945336   Anſwer.
         -------------
```

A Gentleman ſent a Tankard to his Goldſmith that weighed 50*oz.* 8*pwt.* and ordered him to make it into Spoons, each to weigh 2*oz.* 16*pwt.* How many Spoons had he?

Anſwer, 18 Spoons.

A Gentleman delivered to a Goldſmith 137 *oz.* 6 *pwt.* 9 *gr.* of Silver, and ordered him to make it into Tankards of 17 *oz.* 15 *pwt.* 10 *gr.* each; Spoons of 21 oz. 11 *pwt.* 13 *gr.* *per* Dozen; Salts of 3 *oz.* 10 *pwt.* each; and Forks of 21 *oz.* 11 *pwt.* 13 *gr.* *per* Dozen;—for every Tankard to have one Salt, a Dozen of Spoons, and a Dozen of Forks; What is the Number of each he muſt have?

```
    oz.  pwt.  gr.                      oz.  pwt.  gr.
    17 – 15 – 10                        137 – 6 – 9
    21 – 11 – 13                         20
     3 – 10 – —                         ------
    21 – 11 – 13                        2746
   ---------------                        24
    64 –  8 – 12                        ------
    20                                  10993
   ----                                 5492
  1288                      30924 )    ------  ( 2
    24                                  65913
   ----                        24 )    ------  ( 9
  5154                                  4065
 2577                          20 )    ------  ( 9
 -----                                   16
 30924                                  -----
 -----                                    8
                                        -----
```

Anſwer, 8 *oz.* 9 *pwt.* 9 *gr.*

In 3 *lib.* 10 *oz.* of Gold, How many Mourning Rings can be made, each weighing 2 *pwt.* 12 *gr.*?

Anſ. 368 Rings.

* * *

AVOIRDUPOISE WEIGHT.

In 7273421 Drams, How many Tons?

```
       dr.           16) oz.     28) lb.    4) qr.
16) 7273421  ( 454588  ( 28411  ( 1014
    87            134          41    20) 25 ( 3
     73             65         131        ----
      94            18         ----        12
      142            28         19
        141        ----
       ----          12
         13
```

	tons.	cwt.	qr.	lb.	oz.	dr.
Anſ.	12 –	13 –	2 –	19 –	12 –	13

How many Parcels of Sugar of 16*lb.* 2*oz.* are there in 16*cwt.* 1*qr.* 15*lb.*?

Anſ. 113*lb.* 12*oz.* 14*dr.*

How many Ton of Cheeſe at 30*l.* 10*s.* *per* Ton, is worth three Hogſheads of Tobacco, each weighing 4*cwt.* 1*qr.* 17*lb.* at 10½*d.* *per lb.*

	tons	cwt.	qr.	lb.	oz.	dr.
Anſ.	2 –	2 –	1 –	20 –	4 –	14 $\frac{01}{81}$

CLOTH

CLOTH MEASURE.

In 4920 Ells Flemiſh, How many Ells Engliſh?

```
        4920
           3
     -------
  5) 14760
     -------
Anſwer,  2952
     -------
```

Reduce 456 Ells French, into Ells Flemiſh?

```
      456
        6
   ------
3) 2736
   ------
      912  Anſwer.
   ------
```

Bring 560 Yards into Engliſh Ells.

Anſwer, 448.

In $911\frac{1}{4}$ Yards, How many Ells Engliſh?

Anſwer, 729.

How many Holland Shirts may be made out of 237 Pieces, each Piece being 37 3-5ths Ells Engliſh, when one Shirt contain 4 Yards 2 Nails?

Anſ. $2700\frac{24}{66}$ Holland Shirts.

In 374 Pieces, each $27\frac{1}{2}$ Ells Engliſh, How many Garments of $7\frac{3}{4}$ Yards each?

Anſ. $1658\frac{108}{124}$ Garments.

In 12 Bales of Cloth, each 25 Pieces, each 15 Engliſh Ells, How many Yards and Flemiſh Ells?

Anſwer, 5625 Yards.
7500 Flemiſh Ells.

If 100 Soldiers are to have new Coats and Breeches, each Coat to contain $3\frac{3}{4}$ Yards at 2*s.* 10*d. per* Yard, and each Pair of Breeches $1\frac{1}{2}$ Ell Engliſh at 3*s.* 4*d. per* Ell; I Deſire to know how many Yards it will take, and what it will Coſt?

Anſwer, $572\frac{1}{2}$ Yards.
72 *l.* 12 *s.* 6 *d.*

LONG MEASURE.

TABLE.

CONTRACTIONS.—For Barley-Corn, read *bar.*

3	Barley-Corns	make	1	Inch	*in.*
12	Inches		1	Foot	*foot*
3	Feet		1	Yard	*yd.*
6	Feet		1	Fathom	*fath.*
5	Yards		1	Rod, Perch or	*pole*
40	Poles		1	Furlong	*fur.*
8	Furlongs		1	Mile	*mile*
3	Miles		1	League	*lea.*
60	Miles		1	Degree	*deg.*

Example.

In 57 Miles, How many Furlongs and Poles?

$$\begin{array}{r} 57 \\ 8 \\ \hline 456 \\ 40 \\ \hline 18240 \\ \hline \end{array}$$

Anſwer, 456 Furlongs.
18240 Poles.

In 72 Miles, How many Feet, Yards and Fathoms?

$$\begin{array}{r}
5280 \\
72 \\
\hline
10560 \\
36960 \\
\hline
3\,)\,380160 \\
\hline
2\,)\,126720 \\
\hline
63360 \\
\hline
\end{array}$$

Anſwer, { 380160 Feet.
126720 Yards.
63360 Fathoms.

In 3010148 Poles, How many Fathoms?

$$\begin{array}{r}
3010148 \\
5\frac{1}{2} \\
\hline
15050740 \\
1500024 \\
\hline
2\,)\,16550764 \\
\hline
\textit{Anſ.}\quad 8275382 \\
\hline
\end{array}$$

How many Times will the Wheel of a Wheelbarrow, whoſe Circumference is 2 Feet 10 Inches, turn round between Weſt-Pennard Church, and the Hare and Hounds Inn, in Long-Sutton; ſuppoſing it to be 12 Miles 7 Furlongs?

Anſwer, 23992 Times.

A Gentleman hired a One-Horſe Chaiſe, to carry him from a certain Place to London, it being $117\frac{1}{2}$ Miles, and was to give him Sixpence for every Hundredth Time that the Wheels did turn round between the ſaid Places, the Wheels being $13\frac{3}{4}$ Feet in Circumference;—I deſire to know, How many Times the Wheels turn'd round, and how much he ought to pay for his Hire?

Anſwer, Turn'd round 45120 Times.
11*l.* 5*s.* 6*d.* $\frac{2}{100}$ for the Hire.

In 410572800 Barley-Corns, How many Ells, Fathoms, Yards, Poles, Furlongs, Miles and Degrees?

Anſwer,
3041280 Ells.
1900800 Fathoms.
3801600 Yards.
691200 Poles.
17280 Furlongs.
2160 Miles.
360 Degrees.

SQUARE

SQUARE MEASURE.

BY this Meaſure are meaſured, all Sorts of Flat Things that have Length and Breadth; ſuch as Land, Painting, Plaiſtering, Flooring, Thatching, Plumbing, Glazing, *&c.*

TABLE.

144	Inches	make	1	Foot
9	Feet		1	Yard
100	Feet		1	Square of Flooring
272	Feet		1	Rod
40	Rods		1	Rood
4	Roods		1	Acre
640	Acres		1	Square Mile
30	Acres		1	Yard of Land
100	Acres		1	Hide of Land

Note, 160 Rods, or 4840 Yards, is 1 Acre.

Example.

Example.

How many Marble Stones, 9 Inches Square, will floor a Room 18 Feet Square?

```
   Inch.              Feet.
     9                  18
     9                  18
   -----              ------
    81                 144
   -----                18
                     -------
                       324
                       144
                     -------
                      1296
                     1296
                     324
             ----------------
          81)46656(576
               615
                486
                ------
                ...
```

Anſwer, 576 Stones.

How many Tiles, 10 Inches Square, will floor a Malt-Kiln, 16 Feet long, and 12 Feet wide?

Anſwer, $276 \frac{48}{100}$ Tiles.

A Room, 30 Feet long, and 18 Feet wide, to be covered with painted Cloth; How many Yards of 3-4ths wide will cover it?

Feet.	Inches.
30	36
18	27
240	252
30	72
540	972
144	
2160	
2160	
540	

972) 77760 (80

Anſwer, 80 Yards.

A Thatcher new thatch'd the Roof of a Barn; the Length was 65 Feet, and the Breadth from the Top of the Roof to the Eves, 25 ditto; How many Squares did it contain?

Anſwer, 16¼ Squares.

LAND

LAND MEASURE.

TABLE.

FORTY Spuare Poles, or Perches, make one Rood, or Yard; and four Roods, or Yards, or one Hundred and Sixty Square Poles, make one Statute Acre.

Rule.

When you have Feet, or half Feet, in the Length or Breadth, or both of them, bring it into half Feet, by multiplying by the Number of Feet in one Perch, *(viz.* 33;*)* then multiply the Length and Breadth together, and divide that Product by 1089, the Square half Feet in one Perch, and it will ſhew the Contents in Perches; which divide by 40, and that Quotient by 4 will give the Area, or Anſwer in Acres.

Example.

How many Acres are contained in a Field, 30 Rods wide, and 40 Rods long?

Rods.
40
30

4|0) 120(0

4) 30 (2
7

Anſwer, 7 Acres and 2 Roods.

In a Field 68 Perch long, and 40½ Perch wide, How many Acres?

68
40½

2720
34

4|0) 275(4

4) 68 - 34

Anſwer, 17 - 0 - 34

Bring 47952 Square Poles into Acres.

```
4|0 ) 4 7 9 5 ( 2
   ----------( 3
  4 ) 1 1 9 8
   ----------( 2
```

Anſwer, 299A. – 2R. – 32P.

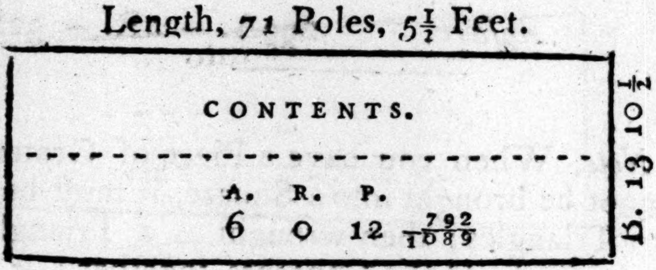
Note, When you have a Piece of Ground, that cannot be brought into a Square, it muſt be divided into Triangles; then wrought as a Triangle ſeperately, and add the Contents together.

Firſt, View your Field over, and ſet up Marks where you intend to make your Angles; then draw your Baſe Line or Lines.

Secondly, Your Baſe Lines being drawn, you are to proceed to find a true Perpendicular, which is done by ſetting a Teleſcope, or any other Sight on the Baſe-Line, in ſuch Order, that the Sight may reach the upper Corner of the Angle; then draw a Line from that to the Baſe, where you ſtand, or take the Sight from, and it will ſhew a a true Perpendicular.

☞ The Way to meaſure Land according to this Rule, is by having a Chain of any Number of Links, each Link to be juſt ſix Inches in Length.

What's the Contents in Acres of an Oblong Square, it's Length being 71 Poles $5\frac{1}{2}$ Feet, and Breadth 13 Poles $10\frac{1}{2}$ Feet?



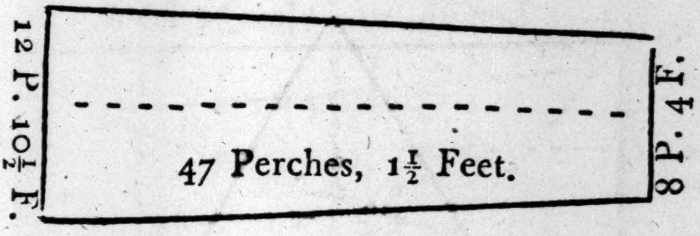
$71 - 5\frac{1}{2}$
33
214
214
2354
450
117700
9416
1089) 1059300 (972
7920
2970
792

$13 - 10\frac{1}{2}$
33
40
41
450

4|0) 9 7 (2
(1
4) 2 4

Anſwer, 6A. 0R. 12P. $\frac{367}{1089}$

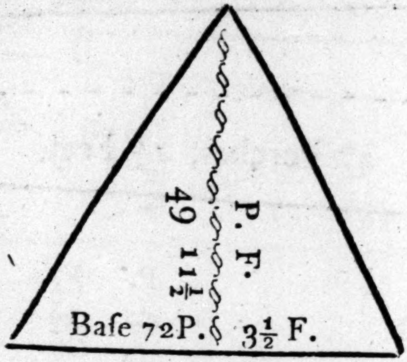
An irregular Square Piece of Land, whoſe wideſt End is 12 Perches 10½ Feet, the narroweſt End 8 Perches 4 Feet, and Length 47 Perches 1½ Feet; What's the Contents in Acres?



```
   P.    F.               P.    F.          P.   F.
   12    10½              47    1½           8    4
   33                     33                33
  ----                   ----              ----
   37                    144                32
  38                    141                24
  ----                  ----               ----
  417                   1554               272
  272                    344½              ----
  ----                  -----
2) 689                  6216
  ---- (1              6216
  344                 4662
  ----                  777
                     ------        4|0
          1089) 535353 (          57 (4
                 9085            ---- (1
                  4623        4) 14
                 ------          ---- (2
                   267            3
                 ------          ----
```

Anſ. 3A. 2R. 14P. $\frac{267}{1089}$

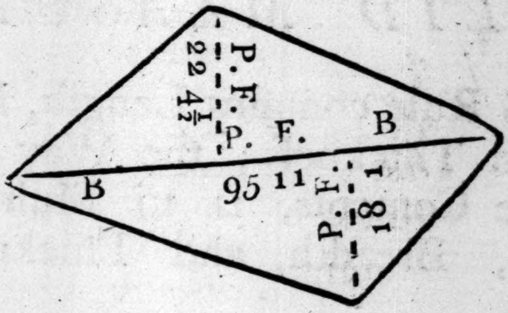
In a Triangular Piece of Ground, (repreſenting the Form under) the Baſe is 72 Perches, $3\frac{1}{2}$ Feet; and the Perpendicular 49 Parches, $11\frac{1}{2}$ Foot:— What's the Contents in Acres?



```
          P.   F.                       P.    F.
          72 - 3½                       49 - 11½
          33                            33
        -----                         -----
        2383                           150
         820                          149
      --------                       -------
       47660                       2) 1640
      19064                          -------
      --------  4|0                     820
1089) 1954060  (179 (4               -------
       8650    -----  (3
       10276  4) 44
        4750   -----
      -------    11
         394   -----
      -------
```

Anſ. 11A. 43P. $\frac{394}{1085}$

Suppoſe a Piece of Ground be in the Form of a Trapezium, (whoſe Dimenſions is in the Form underneath), I demand the Contents in Acres?



22P. - 4½F.
33

75
66

735
596

1331

95P. - 11F.
33

287
287

2) 3157

1578½
1331

1578
4734
4734
1578665½

4|0
1089) 2100983 (192 (9
10119
3188
10103

302

4) 48

12

18P. - 1F.
33

56
54

596

Anſ. 12A. 9P. $\frac{302}{1089}$

SOLID MEASURE.

THIS Rule contains Length, Breadth, and Thickneſs; the Way to find out the Contents, is to Multiply the Length, Breadth, and Thickneſs together.

TABLE.

Sixty-four ſolid Quarters make 1 Inch, 1728 Inches make 1 ſolid Foot, and 27 ſolid Feet make 1 ſolid Yard.

This ariſes from the following Reaſons:—4 × 4 =16 × 4=64 Quarters; 12 × 12=144 × 12= 1728 Inches; and 3 × 3=9 × 3=27 Feet=1 Yard.

Example.

How many ſolid Inches are contained in a Pudding 1 Foot long, 1 Foot wide, and 15 Inches Thick?

```
    1 2 Inches
    1 2
  -----
  1 4 4
    1 5
  -----
*Anſwer*, 2 1 6 0 ſolid Inches.
  -----
```

A Perſon having a Piece of Ivory, 13 Feet long, 10 wide, and 6 Inches thick; How many Dice will it make, ſuppoſing each Die to be a Quarter of an Inch every Way?

Inch.
15
10

150
6

900
64

3600
5400

Anſwer, 57600 Dice.

In three Square Pieces of Timber, each 12 Feet long, 14 Inches wide, and 4 Inches thick; What's the ſolid Contents?

12 × 12 = 144
14

2106
4

8064
3

Anſ. 24192

LIQUID MEASURE.

WINE MEASURE.

2 Pints (make)	1 Quart
4 Quarts	1 Gallon
10 Gallons	1 Anchor Brandy
18 Gallons	1 Runlet
31½ Gallons	Half a Hogſhead
42 Gallons	1 Tierce
63 Gallons	1 Hogſhead
2 Hogſheads	1 Pipe or Butt
2 Pipes, or 4 Hogſheads	1 Ton.

BEER MEASURE.

2 Pints (make)	1 Quart
4 Quarts	1 Gallon
8 Gallons	1 Firkin of Ale
9 Gallons	1 Firkin of Beer
4 Firkins, or 2 Kilderkins	1 Barrel
1½ Barrel, or 54 Gallons	1 Hhd. of Beer
2 Barrels	1 Puncheon
3 Barrels, or 2 Hogſheads	1 Butt.

In 5896 Gallons of Canary, How many Pipes and Hogſheads, and of each an equal Number?

Gal. Gal.
189)5896(31 129
226 63
37 189

Anſwer, 31 of each, and 37 Gallons over.

A Gentleman ordered his Butler to bottle off 2-3ds. of a Pipe of French Wine into Quarts, and the reſt into Pints; I deſire to know, How many Dozen of each he had?

63
2
126
4
3)504
168
12)336
28

Anſwer, 28 Dozen of each Sort.

How many Firkins of Beer Meaſure will hold 718 Hogſheads of Cyder Meaſure?

```
      Hogſheads.
          718
           63
        -----
         2154
        4308
        -----
        45234
          231
        -----
        45234
      135702
      90468
     --------            9)
282)10449054(37053
      1989             -----
        1505           4117
         954           -----
        -----
         108
        -----
```

Anſwer, 4117 Firkins, $\frac{108}{282}$

If a Vintner be deſirous to draw off a Pipe of Wine into Bottles of Pints, Quarts, and 2 Quarts, and of each an equal Number; I demand how many Dozen of each Sort he muſt have?

Anſwer, 12 Dozen.

If I ſhould chuſe to draw off 60 Hogſheads of London Porter, into 30 Wine Pipes, and not having a Caſk to hold the difference; I deſire to know the Largeneſs of the Veſſel I muſt Order, that will juſt hold it?

```
        Pipes.                      Hogſheads.
           30                            60
            2                            54
        ------                       ------
           60                           240
           63                          300
        ------                       ------
          180                          3240
         360                            282
        ------                       ------
         3730                          6480
          231                        25920
        ------                        6480
         3780                        ------
       11340                         913680
        7560                         873180    54)
       ------                        ------  (143(2
       873180              282)       40500    -----
       ------                         1230      35
                                      1020    -----
                                     ------
                                       174
                                     ------
```

Anſwer, 2 Hogſheads and 35 Gallons.

DRY MEASURE.

T A B L E.

2	Pints (make)	– –	1	Quart
2	Quarts	– – –	1	Pottle
2	Pottles	– –	1	Gallon
2	Gallons	– – –	1	Peck
4	Pecks, or 2150 ſolid Inches		1	Buſhel
2	Buſhels	– –	1	Strike
4	Buſhels	– – –	1	Coomb
2	Coombs, or 8 Buſhels	–	1	Quarter
4	Quarters	– –	1	Chaldron
5	Quarters	– –	1	Wey
2	Weys	– –	1	Laſt.

Example.

In 30720 Quarts, How many Quarters?

8) 30720 Quarts.

4) 3840

8) 960

Anſwer, 120 Quarters.

In 7193 Buſhels, Land Meaſure, How many Chaldrons Water Meaſure?

Buſhels.
7193
4

5) 28772 (2
8) 5754 (2
4) 719 (3
179

Anſwer, 179Ch. – 3Q. – 2B. – 2P.

In 273 Laſts of Corn, How many Pecks?

Laſts.
273
10

2730
8

21840
4

87360

Anſwer, 87360 Pecks.

In a Ciſtern that is 72 Inches long, 50 Inches broad, and 43 Inches deep, How many Buſhels?

Inches.
72
50
3600
43
10800
14400
2150) 154800 (72 *Anſwer.*
4300
. . . .

In a Floor of Malt, 180 Inches long, $110\frac{1}{2}$ broad, and the Depth taken at four different Places; I demand the Contents in Buſhels?

16 Inches.
12
10
15
4) 53
$13\frac{1}{4}$

Anſwer, 122 Buſhels, $\frac{1242}{2150}$

There are, we will ſuppoſe, three Coolers, *viz*, the firſt is Length 113 Inches, Breadth 33 Inches, and Depth 11 Inches; the ſecond Cooler is in Length 42 Inches, Breadth 42 Inches, and Depth 12 Inches; the third Cooler is a Triangular, whoſe Baſe is 118 Inches, Perpendicular 38 Inches, and Depth 6 Inches;—I demand how many Buſhels each will hold, and what the Sum of their Difference is?

Inches.	Inches.
113	42
33	42
339	84
339	168
3729	1764
11	12
2150) 41019 (19	2150) 21168 (9
19519	
	4
	1818
169	2150) 7272 (3
	822

B.	P.
19	– 0
6	– 1
12	– 3

Inches.
118
19

2242
6

2150) 13452 (6
552
4

2150) 2208 (1

68

B. P.
9 – 3
6 – 1

3 – 2

B. P.
19 – 0
9 – 3

9 – 1
3 – 2
12 – 3

25 – 2

B. P.
Anſ. 25 – 2 Sum of the Difference.
35 – 0 Contents of the Coolers.

B. P.
19 – 0
9 – 3
6 – 1

35 – 0

What's the Contents of a Floor of Malt, having Dimenſions as follows, *(viz.)* Length 330 Inches, Breadth 169 Inches, and Depth taken at five different Places in Inches, and the eighth Part of an Inch; allowing 2150$\frac{2}{5}$ ſolid Inches to a Buſhel?

	Inch.		Parts.
1ſt. Depth —	9	-	1
2d. Ditto —	9	-	7
3d. Ditto —	10	-	2
4th Ditto — —	10	-	5
5th Ditto —	10	-	6
5)	50	-	5
	10	-	1
	8		
	81		
	5		
	405		

Solid Inches.

2150$\frac{2}{5}$
8

17203$\frac{1}{5}$
5

86016

Inches.

```
                    330
                    169
                  -----
                   2970
                  5280
                 ------
                  55770
                    405
               --------
                 278850
               223080
              ---------
86016)22586850(262
        538365
         222690
        -------
          50658
              4
        -------
86016)202632(2
        -------
          30600
              8
        -------
86016)244800(2
        -------
          72768
        -------
```

B. P. Q.

Anſwer, 262 - 2 - 2 $\frac{72768}{86016}$

How many Buſhels does a Cooler contain, its Dimenſions being taken in Inches, and the 10th Part of an Inch, *viz.* Length 57 Inches 9 Parts, Breadth 35 Inches 7 Parts, and Depth taken at three ſeveral Places.

	Inch.	Pr.
1ſt. Depth —	6	0
2d. Ditto —	5	6
3d. Ditto —	3	5
3)	17	1
	5	7
	10	
	57	

Inch.	Pr.
35	7
10	
357	

Parts.

10
10
100
10
1000
$2150\frac{2}{5}$
1000
2150400

Inch.	Parts.
57	- 9
10	

579

357

4053

2895

1737

206703

57

1446921

1033515

2150400) 11782071 (5

1028071

4

2150400(4112284(1

1961844

Anſ. 5B. 1P. $\frac{1961844}{2150400}$

T I M E.

TABLE.

13 Months, 1 Day and 6 Hours, or 365 Days and 6 Hours, or 8766 Hours, make 1 Year.

60	Seconds	(make)	1 Minute
60	Minutes	—	1 Hour
24	Hours	—	1 Day
7	Days	—	1 Week
4	Weeks	—	1 Month
13	Months, 1 Day		1 Julian Year.

How many Times doth a regular Clock ſtrike in one Year?

$$\begin{array}{r} 1\\ 12\\ \hline 13\\ 6\\ \hline 78\\ 2\\ \hline 156\\ \hline \end{array} \qquad \begin{array}{r} 156\\ 365\\ \hline 780\\ 936\\ 468\\ \hline 56940\\ \hline \end{array}$$

Anſwer, 56940 Times.

MOTION,

PERFORMED in a Circle, eſpecially in reſpect of the Eliptic in Aſtronomical Affairs, and are divided in the following Manner, *viz.*

60 Seconds	(make)	1 Minute
60 Minutes	—	1 Degree
30 Degrees	—	1 Sign
12 Signs, or 360 Degrees	—	the Circle

In very nice Matters we ſub-divide a Second into 60 Thirds, (‴) and a Third into 60 Fourths. (⁗)

Note, A Circle contains

°		′				H		M	
360	-	0	in Motion,	=		24	-	0	of Time.
15	-	0	Ditto,	=		1	-	0	Ditto.
1	-	0	Ditto,	=		0	-	4	Ditto.
0	-	15	Ditto,	=		0	-	1	Ditto.

In one Revolution of the ſame Circle, How many Seconds?

Anſwer, 1296000 Seconds.

In 9876543210 Fourths, (⁗) How many Revolutions?

	R		S		°		′		″		‴		⁗
Anſwer,	2	–	1	–	12	–	4	–	44	–	13	–	30

RULE OF THREE.

THIS Rule is ſo called by its having three Numbers given to find out a fourth, in ſuch Proportion to the ſecond as the firſt is to the third. It is alſo called the Rule of Proportion, becauſe, as the firſt Number is to the third, ſo in Proportion is the ſecond to the fourth.

Rule.

Firſt, State your Queſtion, in ſuch Order, that your firſt and third Number be of one Name, or Denomination; then bring you ſecond Number into the loweſt Term required.

Secondly, Multiply your ſecond and third Numbers together, and divide that Product by the firſt Number, and it will give the Anſwer in the ſame Term your ſecond Number is in.

Laſtly, If your Quotient be in Farthings, divide by four, twelve and twenty, and it will give the Anſwer in Pounds, and ſo accordingly in Weights, Meaſures, &c.

Example.

If one Pair of Shoes coſt 4*s.* 6*d.* What is the amount of Twelve Dozen.

Pair. Dozen.
If 1 ———— 5*s.* 6*d.* ———— 12
12

6 – 4 – 0
12

76 – 8 – 0

Anſwer, 32*l.* 8*s.*

If a Man ſpends five Farthings per Day, What does it come to at the Year's End?

If 1 —— $1\frac{1}{4}$ —— 365
5

4) 1825
(1
12) 456

2|0) 3 (8

Anſwer, 1*l.* 18*s.* $0\frac{1}{4}$*d.*

If $3\frac{1}{2}$lb. of Cheſhire Cheeſe coſt 1*s.* 1*d.* What muſt I give for 1 Cwt.?

Anſwer, 1*l.* 14*s.* 8*d.*

If one Yard of Holland coſt 7*s.* 6*d.* How many Yards can I have for 33*l.*?

Anſwer, 88.

What is the Intereſt of 654*l.* 8*s.* 4*d.* for one Year, at 5 per Cent.?

Anſwer, 32*l.* 14*s.* 5*d.*

A gentleman having an Annuity of 896*l.* per Annum, I deſire to know how much he can afford to ſpend every Day, ſo that at the Year's End he may lay up 200 Guineas, and give to the Poor, Quarterly, 10 Moidores?

Anſ. 1*l.* 14*s.* 8*d.*

A Grocer bought an equal Quantity of Sugar, Tea, and Tobacco, for 704*l.* 3*s.* 4*d.* for the Sugar he gave $10\frac{1}{2}$*d.* Tea 5*s.* 6*d.* and Tobacco $10\frac{1}{2}$*d.* per Pound; How many Pounds of each Sort had he for his Money?

Anſ. 1690 of each Sort.

A Cheeſe-monger bought 650 Cheeſes, each weighing 10lb. which coſt him 80 Guineas, now he ſold it at Retail for $3\frac{1}{2}$*d.* per lb. I demand whether he gained or loſt by it, and how much?

Anſ. He gained 10*l.* 15*s.* 10*d.*

A Wine Merchant imported 18 Pipes of Wine, which coſt him 149*l.* 10*s.* 6*d.* Freight 32*l.* 12*s.* Cuſtom 61*l.* 1*s.* Loading and Unloading, Carts and Porters, 17*l.* 6*s.* 6*d.* What does the Wine ſtand him in per Gallon?

Anſwer, 2*s.* 3*d.* per Gallon.

A Plummer bought 9 Cwt. of Lead, which coſt him ſix Guineas, I demand to know what it was a Pound?

Anſwer, 1½ per Pound.

If the Shadow of a Stick, one Yard nine Inches long, gives five Yards, What is the Highth of a Steeple, whoſe Shadow is one Hundred and Seventy-two Yards?

Anſwer, 43 Yards.

If one Pound and half of Butter, coſt 8*d.* What will two Pound coſt after the ſame Rate?

Anſwer, 10½*d.* $\frac{16}{24}$, or $\frac{2}{3}$.

The RULE of THREE Inverſe.

IT is ſo called, becauſe the Performance is contrary to the Former: for as the *Golden Rule*, or *Rule of Three*, is performed by multiplying the ſecond and third Numbers together, and dividing that Product by the firſt Number, the *Rule of Three Inverſe*, is quite the *Reverſe*; for inſtead of multiplying the ſecond and third Numbers together, you muſt multiply your firſt and ſecond together, and divide that Product by your third Number.

Rule.

First place your Numbers in ſuch Order, that your firſt and third Numbers be of one Name; then multiply your firſt and ſecond Numbers together, and divide that Product by the third, and the Quotient will be the Anſwer, in the ſame Terms your ſecond Number is in.

Example.

Example.

If 54 Men can build a Houſe in 90 Days, How many Men can do the ſame in 50 Days?

Days. Men. Days.
If 90 ——— 54 ——— 50
90
———
5|0)486(0
——— 1
97
———

Anſwer, 97 Men.

A Perſon lent me 1000*l.* for nine Months, he afterwards borrowed of me 750*l.* What Time muſt I lend this Sum to him, to return the former Kindneſs he had done me?

Pound. Months. Pounds.
If 1000 ——— 9 ——— 750
9
———
75|0)900(0
———
12
———

Anſwer, 12 Months.

If a Board be nine Inches broad, How much in length will make a ſolid Foot?

Anſwer, 16 Inches.

If 900 Men are to have new Coats, each containing $3\frac{1}{2}$ Yards, 5 Quarters wide, and are to be lined with Shalloon, 3 Quarters wide, How many Yards of Shalloon will it take to line them?

Anſwer, 5250 Yards.

If Flour is 6*s*. 8*d*. per Buſhel, and a Threepenny Loaf weighs 2 lb. 6 oz. How much ought he to weigh, when the ſame Sort of Flour is ſold for 5s. per Buſhel?

Anſwer, 3 Pounds.

How many Pieces of Money of twenty Shillings Value, are equal to two Hundred and Forty Pieces of twelve Shillings each?

Anſ. 400 Pieces.

How many Pounds of Coffee, at 5*s*. 9*d*. per lb. is equivalent in Value with 426 Pounds of Tea, at 13*s*. 4*d*. per lb.?

Anſwer, 987 Pounds.

Double RULE of THREE.

WHEN the Proportion is direct, the ſixth Number, (or Number required,) muſt bear the ſame Proportion to the fourth and fifth multiplied together, as the third Number bears to the firſt and ſecond multiplied likewiſe.—In ſtating the Queſtion, therefore obſerve the following Method:

Rule.

Firſt, Make your firſt and fourth Numbers of the ſame Name, or Denomination, as alſo your ſecond and fifth; and let the middle, or third Number, be of the ſame Name that your Anſwer is required in. ——— Multiply your firſt and ſecond Numbers together for a Diviſor, and your third, fourth and fifth together for a Dividend; then divide the Dividend by the Diviſor, and the Quotient will be the Anſwer, in the ſame Name your middle or third Number is in.

Example.

Example.

If a Regiment, conſiſt of 900 Soldiers, eat up 300 Quarters of Wheat in 150 Days, I demand How many Quarters 7200 Soldiers will eat in 50 Days, at the ſame Rate?

```
  Days.     Soldiers.   Quarters.    Soldiers.     Days.
If 150 ——— 900 ——— 300 ——— 7200 ——— 50
             150                  300
          ———————             ——————————
           45000               2160000
             900                    50
         ——————————          ————————————
          135(000           135)108000(000
```

Anſwer, 800 Quarters.

If 100 Pounds Principal, in twelve Months, gain five Pounds Intereſt, What will 246 Pounds gain in ſeven Months?

```
    P.         M.        I.        P.        M.
If 100 ——— 12 ——— 5 ——— 246 ——— 7
    12                             7
  ——————                       ————————
   1200                          1722
  ——————                            5
                               ————————
                         120|0)861|0(7
                               ————————
                                  21
                                  20
                               ————————
                           12|0)42|0(3
Anſ. 7l. 3s. 6d.               ——————
                                  6
```

Bought a Quantity of Fuſtian and Shalloon, for 72*l*. there there were 240 Yards of Fuſtian, at 3*s*. 6*d*. per Yard: he had three Yards of Shalloon to every two Yards of Fuſtian: I demand how many Yards of Shalloon, and Price per Yard?

```
If 1 ———————— 3s. 6d. ———————— 240
                12                42
               ————             ——————
                42               480
     240       ————              960
       3                       ————————
    ——————                    12) 0080
  2) 720                       ———————
    ——————                    2|0) 84(0
     360                        ——————
    ——————                        42
                                ——————

     If 360 ———————— 30l. ———————— 1
                          20
                         ————
  72                     600
  42                      12
  ——                  ——————————
  30                36|0)720(0
  ——                  ——————————
                       12) 20
                        ———— (8
                           1
                         ————
```

Anſ, 360 Yards, at 1*s*. 8*d*. per Yard.

If

The RULE of THREE *Reverſe*.

IN this Rule you muſt place your Numbers in ſuch Order, that your ſecond and fourth Numbers be of one Name, or Denomination; as alſo your third and fifth.

Rule.

Multiply your fourth and fifth Numbers together for a Diviſor; and the firſt, ſecond and third, for a Dividend; then divide the Dividend by the Diviſor, and that Quotient is the required Anſwer.

Example.

If 100 Pounds Principal, in twelve Months, gain ſix Pounds Intereſt, What Sum will gain 20 Pounds Intereſt, in eight Months?

	P.		M.		P.		M.		P.
If	100	——	12	——	20	——	8	——	6

```
      100            8
       20            6
     ————         ————
     2000           48
       12         ————
     ————
 48) 24000
     ————
      500
```

Anſwer, 500 Pound.

If 100*l.* Principal, in twelve Months, gain 5*l.* Intereſt, What Principal will gain 3*l.* in nine Months ?

	£.	M.	£.	£.	M.
If	160 ——	12 ——	3 ——	9 ——	5

100   5

1200   45

3

45) 3600 (80

Anſwer, 80 Pounds.

If 500*l.* in eight Months, gain 20*l.* Intereſt, What Principal will gain 6*l.* Intereſt in twelve Months?

	£.	M.	£.	M.	£.
If	500 ——	8 ——	20 ——	12 ——	6

8   20

4000   240

6

24|0) 2400(0

100

Anſwer, 100 Pounds.

⁂

PRACTICE.

PRACTICE.

THIS RULE is ſo called from its excellent Uſe to Merchants, and all others concerned in Buſineſs, and is performed by taking *Aliquot Parts;* the Word, Aliquot, derives from the *Latin* Word, *Aliquoties;* for an Aliquot Part, is Part of a great Number, which being taken different Times, conſtitutes that greater Number; ſo 3 is the Aliquot Part of 15, for 3 taken 5 Times, is equal to 15; alſo 5 is the Aliquot Part of 15, for 5 taken 3 Times, is equal to 15.

Again, the Aliquot Parts of 20 is 4, for 4 Times 5 is equal to 20; likewiſe, the Aliquot Parts of 28, is 7 and 4, for 7 Times 4 is 28, and 4 Times 7 is 28; and for the Learners' better underſtanding the Aliquot Parts, the following Tables is calculated.

TABLES.

Aliquot Parts of a Pound.

s.	d.			
10	0	=	1/2	of a Ponnd.
6	8	=	1/3	
5	0	=	1/4	
4	0	=	1/5	
3	4	=	1/6	
2	6	=	1/8	
2	0	=	1/10	
1	8	=	1/12	

Ditto of a Shilling.

d.			
6	=	1/2	of a Shilling.
4	=	1/3	
3	=	1/4	
2	=	1/6	
1½	=	1/8	
1	=	1/12	

Aliquot Parts of a lib. Troy Weight.

oz.		lib.
6	is	1/2
4	—	1/3
3	—	1/4
2	—	1/6
1½	—	1/8
1	—	1/12

Aliquot Parts of a lb. Avoirdupois Weight.

oz.		lb.
8	—	1/2
4	—	1/4
2	—	1/8
1	—	1/16

Cwt.		Ton.	
10	=	1/2	of a Ton.
5	=	1/4	
4	=	1/5	
2½	=	1/8	
2	=	1/10	
1	=	1/20	

Q.	lb.		Cwt.	
2	0	=	1/2	of a Cwt.
1	0	=	1/4	
	16	=	1/7	
	14	=	1/8	
	8	=	1/14	
	7	=	1/16	

Rule

Rule. I.

When the Price is leſs than a Penny, take ſuch Aliquot Part or Parts, as the Queſtion conſiſts of, add them together, and divide by 12, and then by 20, and that Quotient is the Anſwer.

Example.

lb.
½ is ½ 7695 at ½
(½
3847
(7
32 (0
Anſwer, 16*l*. - 0 - 7½

Proof.
7695
2
15390
3847
320
1 6 0 7½

Queſtion, 8760 Ounces, at ¼ per Ounce.

Anſwer, 27*l*. – 7*s* – 6*d*.

Rule II.

When the Price is leſs than a Shilling, take the Aliquot Part or Parts, that are in a Shilling, add them together, and divide by 20 as before.

Cwt. *d.*
394 at 3¼
98 – 6
24 – 7½
12 (2
Anſwer, 6*l.* 3*s.* 1½*d.*

Proof.
394
3
1182
(½
295
1182
1477
12 (3
6

Queſtion, 1781 Ounces, at 4*d.* per Ounce?
Anſwer, 29*l.* – 13*s.* – 8*d.*

Queſtion, 144 lb. at 4½ per lb.
Anſwer, 2*l.* 14*s.* per lb.

Queſtion, 876 lib. at 5¼ per lib.
Anſwer, 19*l.* – 3*s.* – 3*d.*

Queſtion, 456 lb. at 6*d*. per lb.

Anſwer, 1*l*. – 1*s*. – 6*d*.

Queſtion, 222 lb. at 9¾*d* per Pound?

Anſwer, 9*l*. – 4½*d*.

Queſtion, 242 lib. at 10½*d*. per lib.

Anſwer, 22*l*. - 13*s*. - 9½*d*.

Queſtion, 144 *oz*. at 8½*d*. per Ounce ?

Anſwer, 5*l*. – 2*s*.

Queſtion, 333 yds. at 11¼ per Yard?

Anſwer, 15*l*. - 12*s*. - 2¼*d*.

◆

◆

Rule III.

If your given Price is more than one Shilling, and leſs than two Shillings, take ſuch Aliquot Part, or Parts, as are contained in a Shilling, which add to the given Quantity, and divide the Product by twenty, will give the Anſwer.

Example.

D.	*Yards.* *D.*	*Yards.*
12	2106 at $12\frac{1}{4}$	2106
$0\frac{1}{4}$ is $\frac{1}{48}$	43 – $10\frac{1}{2}$	$12\frac{1}{4}$
	214|9	25272
		526
	107 – 9 – $10\frac{1}{2}$	25798
		214|9 – 10
		107 - 9 - $10\frac{1}{2}$

Queſtion, 5401 Ells at 1*s*. $3\frac{3}{4}$*d*. per Ell?

Anſwer, 354*l*. – 8*s*. – 9*d*.

Queſtion, 7591 lib. at 1*s*. 3*d*. per lib.?

Anſwer, 474*l*. – 8*s*. – 9*d*.

Queſtion, 2310 Ells at 1*s.* $5\frac{1}{2}$*d.* per Ell?

Anſwer, 168*l.* – 8*s.* – 9*d.*

Queſtion, 2104 Yards at 1*s.* 8*d.* per Yard?

Anſwer, 175*l.* – 6*s.* – 8*d.*

Queſtion, 456 Cwt. at 1*s.* $10\frac{1}{2}$ per Cwt.

Anſwer, 42*l.* 15*s.*

Rule IV.

When the Price of your given Quantity is two Shillings per Pound, double the firſt Figure on the Right Hand of your given Quantity for Shillings, and the remaining Number is your Anſwer, in Pounds Sterling.

Example.

48 lb. Tea, at 2 Shillings.

Anſwer, 4*l.* – 16*s.*

Proof.

Proof.

```
48 lb. Tea at 2 Shillings.
 2
———————
 2)0|9|6
———————
Anſ. 4l. – 16s.
```

```
176 Coffee, at 2s.
————
17l. - 12s. Anſwer.
```

```
16 Yards Holland, at 2s.
————
1l. – 12s. Anſwer.
```

* * *

Rule V.

When the Price of the given Quantity conſiſt of any even Number of Shillings under 20, multiply the given Quantity by Half the Number of Shillings, double the firſt Figure on the Right Hand of your Dividend for Shillings, and the remaining Product will be Pounds.

Example.

Example.

248 Yards, at 4 Shillings.
2

49*l.* – 12*s.* *Anſwer.*

Proof.

248 Yards, at 4*s.* per Yard.
4

2|0)99(2

Anſwer, 49*l.* - 12*s.*

Queſtion, 642 Cwt. at 2*s.* per Cwt.

Anſwer, 64*l.* – 4*s.*

Queſtion, 456 Ells, at 12*s.* per Ell?

Anſwer, 27*l.* – 12*s.*

Queſtion, 824 lib. at 16*s.* per lib.?

Anſwer, 659*l.* – 4*s.*

Rule

Rule VI.

When the given Quantity conſiſt of any odd Number of Shillings under 20, multiply the Qnantity by the Number of Shillings, and divide by 20 for the Anſwer.

Example.

286 lb. at 3 Shillings.
3

2|0)85(8

42*l.* - 18*s.*

460 at 7 Shillings
7

2|0)322(0

161*l.* – 0*s.*

N. B. Any odd Number of Shillings under 20, may alſo be performed by taking Aliquot Parts, as more plainly appears by the folllowing Examples.

Example.

Examples.

286 at 3 Shillings.

2*s*. is 1-10th — 28 – 12
1*s*. is 1-half — 14 – 6

42*l*. – 18*s*.

460 at 7 Shillings

5*s*. is 1-4th — 115
2*s*. is 1-10th — 46

Anſwer, 161*l*.

Rule VII.

When the Price of the given Quantity conſiſteth of Shillings and Pence, or Shillings Pence and Farthings, multiply the Quantity by the Number of Shillings; then take Aliquot Parts for the Pence, &c. add them together, and divide by 20 for your Anſwer.

Example.

Examples.

2d is 1-6th   2710 Tons at 3*s.* 2*d.*

3

8130

451

858|1

Anſ.   429*l.* – 1*s.* – 8*d.*

2517 Cwt. at 5*s.* 3*d.*

3*d* is 1-4th

5

12585

629 - 3

1321|4

Anſ.   660*l.* - 14*s.* - 3*d.*

Queſtion, 2547 lb. at 7*s.* 3½*d.*

Anſ. 928*l.* – 11*s.* – 10½*d.*

Queſtion, 3271 lib. at 5*s.* 9¼ ?

Anſ. 943*l.* – 16*s.* – 4¾*d.*

Rule VIII.

When the Price of the given Quantity are Pounds and Shillings, multiply the Quantity by the Number of Pounds, and proceed with the Shillings as before directed; add all the Product together for the Anſwer.

Example.

5*s*. is $\frac{1}{4}$ 248 Cwt. at 4*l*. 5*s*.

4

992

62

Anſwer, £1054

10*s*. is $\frac{1}{2}$ 654 at 2*l*. 15*s*.

2

1308

327

5 is $\frac{1}{2}$ 163 – 10

Anſwer, £1798 – 10*s*.

Queſtion, 7215 Cwt. at 7*l*. 4*s*.

Anſwer, 51948*l*.

Rule IX.

When the Price conſiſteth of Pounds, Shillings and Pence, and the Shillings and Pence the Aliquot Part of a Pound; multiply the Quantity by the Pounds, *(as directed in the laſt Rule)* and take the Aliquot Part, or Parts, for the Remainder.

Example.

	264	Tons, at 4*l*. 2*s*. 6*d*.
	4	
	1056	
2*s*. 6*d*. is $\frac{1}{8}$	33	
Anſwer,	1089	

	482	Cwt. 2*l*. 7*s*. 6*d*.
	2	
	964	
5*s*. is $\frac{3}{4}$	120 – 10	
2*s*. 6*d*. $\frac{1}{4}$	60 – 5	
Anſwer,	£1144 – 15*s*.	

Queſtion, 261 Pieces of Cloth, at 3*l*. 12*s*. 6*d*.

Anſwer, 945*l*. 13*s*. 9*d*.

Rule

Rule X.

When the Price conſiſteth of Pounds, Shillings and Pence; and the Shillings and Pence not the Aliquot Parts of a Pound; reduce the Pounds and Shillings into Shillings; then multiply the given Quantity by the Number of Shillings, take Parts for the Pence, add all that Product together, and divide by 20.

Example.

```
            6 2 Sheep,  at  2l. - 10s. - 4d.
            5 0             2 0
        ---------          -----
        3 0 0 0             5 0
4d. is 3/4    2 0 - 8
        -------------
    2|0) 3 0 2 (0 - 8
    -----------------
Anſ, £1 5 1 - 0 - 8
    -------------------
```

Queſtion, 48 Hogs, at 3*l.* 7*s.* 6*d.* each?

Anſwer, 162 *l.*

Queſtion, 248 Calves, at 2*l.* 15*s.* 8*d.* each.

Anſwer, 690*l.* 10*s.* 8*d.*

Rule

Rule XI.

Whenever the Price and Integers are of ſeveral Denominations, multiply your greateſt Integer by the Number of Pounds in the Price given; take Aliquot Parts for the Reſt; add the Product together, and it will give the Anſwer.

Example.

Cwt. q. lb. l. s. d.
25 – 2 – 14 at 3 – 17 – 6 per Cwt.
5
19 – 7 – 6
5
5 × *5* = *25* = 96 – 17 – 6
2*q.* = 1 – 18 – 9
14 = 9 – 8¼

Anſwer, £99 – 5 – 11¼

Cwt. q. lb. l. s. d.
Or Thus:—25 – 2 – 14 at 3 – 17 – 6 per Cwt.
l. s. d. 3
3 0 0 = 75 s.
10 0 = 12 – 10
5 0 = 6 – 5 d.
2 6 = 3 – 2 – 6
2q. = 1 – 18 – 9
14lb. = 9 – 8¼

Anſwer, 99*l.* – 5*s.* – 11¼*d.*

Qrs. B. P. G. Q. Pts.
2 248 : 7 : 3 : 1 : 3 : 1 Wheat,
2

at 2l. 6s. 6¾d. per Qr.

l.	s.	d.			l.	s.	d.
2					496		
—	4			is to	49	12	
—	2			½	24	16	
—		6		¼	6	4	
—			¾	⅛	—	15	6

B.	P.	G.	Q.	Pts.		l.	s.	d.			
4					is ½	1	3	3¼	½	=	256/512
2					½	—	11	7½	¾	=	384/512
1					½	—	5	9¾	⅜	=	192/512
—	2				½	—	2	3½	11/16	=	352/512
—	1				½	—	1	5¼	27/32	=	432/512
—		1			½	—	—	8¼	59/64	=	472/512
—			2		½	—	—	4¼	59/128	=	236/512
—			1		½	—	—	2	187/256	=	374/512
—				1	½	—	—	1	187/512	=	187/512
					Anſ.	579l.	13	11½			325/512

* * *

Cwt. Q. lb. l. s. d.
Queſtion, 1409 - 1 - 16, at 3 - 18 - 11 per Hundred?

Anſwer, 5561*l*. - 4*s*. - 7 $\frac{1}{7}$

Ton Cwt. Q. lb. l. s. d.
Queſtion, 573 - 13 - 2 - 18, at 9 - 12 - 10 per Ton?

Anſwer, 5531 - 5 - 2 - $\frac{1}{2}$ $\frac{5}{28} = \frac{100}{560}$

Cwt. Q. lb. l. s. d.
Queſtion, 72 - 1 - 18, at 4 - 5 - 8 per Cwt.

Anſwer, 310*l*. - 3*s*. - 2½*d*. $\frac{27}{68}$

Cwt. Q. lb. l. s. d.
Queſtion, 172 - 3 - 12, at 4 - 15 - 4 per Cwt.

Anſwer, 823*l*. - 19*s*. - 0½*d*. $\frac{4}{14}$

◆

TARE

TARE AND *TRETT*,

IS an Allowance made to Merchants in buying their Goods, and is contained under the four following *Rules*, Groſs, Tare, Trett, and neat Weight.

GROSS WEIGHT, is the Weight of the Goods and the Veſſel, or any Thing wherein it is put, or contained.

TARE, is the Weight of the empty Veſſel, Caſk, Bag, Barrel, Frail, *&c.* either before the Goods is put in, or after it is taken out.

TRETT, is a certain Allowance of 4lb. for every 104lb, or 1lb. for every 26lb. of the Subtile Weight on Goods for Duſt, Waſte, *&c.*

NEAT WEIGHT, is the Weight of the Goods only, when all other Abatements are deducted.

Note, SUTTLE WEIGHT, is the Weight of the Goods, when the Tare only is abated; no Trett being allowed on ſuch Goods or Commodities, then that *Suttle Weight* is the neat Weight.

Example.

Cwt. Q. lb.
Suppoſe 15 - 3 - 13 Tare, were allowed on 456 Hundred, 1 Quarter, 19 Pound of Tobacco, What will be the neat Weight?

	Cwt.	Q.	lb.
	456 -	$\frac{1}{4}$ -	19
	15 -	$\frac{3}{4}$ -	13
Anſwer,	440 -	$\frac{1}{2}$ -	6

In 3798 Cwt. Groſs, Tare 28 lb. How many Hundred neat Weight?

	Cwt.	Q.
	3798	
28lb. is $\frac{1}{4}$	949 -	2
Anſwer,	2848 -	2

What muſt I pay for 39 Cwt. Sugar, Tare 15lb. *per Cent.* Trett, at 4*s.* 6*d.* *per lb.*?

Anſwer, 818*l.* - 8*s.* - 9*d.*

In

Queſtion, In 7 Bags of Hops, Quantity Groſs, 23 Cwt. 2 Q. 14 lb. Tare 27 lb. per Bag, and Trett 4 lb. per 104 lb. How many lbs. neat?

Anſwer, 2362 ½ Pounds.

Queſtion, If 1 lb. of Virginia Tobacco coſt 10½*d*. What coſt 3 Hhds. weight 17 Cwt. 2 Q. 12 lb, Groſs, Tare 37 lb. per Hhd. Trett &c.

Anſwer, 81*l*. – 8*s*. – 9*d*.

Queſtion, A Grocer bought 4 Hhds. of Sugar, Groſs weight 53 Cwt. 16 lb. Tare 5 Cwt. 2 Q. 2 lb. Trett 4 lb. for every 104 lb. What is the neat Weight, and Price, at two Guineas per Hundred?

Anſwer, 96*l*. - 13*s*. - 5*d*.

Queſtion, 20 Cwt. 2 Q. 13 lb. of Snuff, Groſs, Tare 12 lb. per Cwt. at 10*d*. per lb. neat Weight, What will it coſt?

Anſwer, 85*l*. - 18*s*. 0*d*.$\frac{2}{28}$

Queſtion, 839 Cwt 2 Q. 17 lb. Tea, Groſs, Tare 22 lb. per Cwt. Trett 4 lb. for every 104 lb. How many Hundred neat Weight?

Anſwer, 646 Cwt. - 2 Q. - 16 lb.

INTEREST,

IS a Gratuity required by the Perſon who lend any Sum of Money, for a limited Time, at a Rate *per Cent.* agreed on between the Borrower and Lender, and are deſcribed under the following Heads:

Firſt, The Principal is the Sum lent upon Intereſt

Secondly, The Rate *per Cent*, agreed on, between the Borrower and Lender.

Laſtly, The Time for which the Principal Money is lent, for which Intereſt muſt be paid.

Rule.

Multiply the Principal by the Rate *per Cent*, then cut off two Figures on the right Hand, and the remainder on the left Hand is the Intereſt required for one Year.—*See the following Example.*

Example.

Example.

What's the Intereſt of 278*l.* at 5 *per Cent. per Annum?*

```
       278
     ------
     13|90
        20
     ------
     18|00
     ------
```

Anſwer, 13*l.* – 18*s.*

Queſtion, What is the Intereſt of 510*l.* 10*s.* at 5 *per Cent. per Annum?*

Anſwer, 13*l.* – 18*s.* – 1*d.* $\frac{1}{5}$.

Queſtion, What is the Intereſt of 375*l.* for one Year, at 5 *per Cent. per Annum?*

Anſwer, 18*l.* – 15*s.*

Note, As Intereſt is performed by the Rule of Three, have only ſet a few Examples,——There is alſo a Rule of Compound Intereſt, but as it is quite unneſſary, have omitted it.

Commiſſion is likewiſe performed in the above Manner, *viz.* Multiply the Sum by the Commiſſion, and cut off the Figures as in the laſt Rule.

STOCK-PURCHASING.

* * * *

THE Purchaſing of Stocks, is Buying a Sum of Money in the Bank, or other Stocks, at a certain Rate *per Cent*, and is performed by the following Rule.

Rule.

Multiply the Sum purchaſed, by the Rate *per Cent*, according as in *Compound-Multiplication*; add that Product together, and then proceed as in Intereſt.

Example.

What's the Purchaſe of 450*l.* at 30 *per Cent.*?

3

3 × 10 = 30

1350

10

Anſwer, £1·35|00

What muſt I pay for the Purchaſe of 360*l.* 10*s.* Bank Stock, at 92½ *per Cent.*?

```
 360 - 10
        8
 ________
 2884 - 0
        4
 ________
 11536
   180
 ______
 117|16
     20
 ______
   3|20
     12
 ______
   2|40
 ______
      4
 ______
   4|60
 ______
```

Anſwer, 117*l.* - 3*s.* - 2½*d.* $\frac{60}{100}$ or $\frac{3}{5}$.

Queſtion, At 1104¼ *per Cent.* What is the Purchaſe of 2054*l.* South-Sea Stock?

Anſwer, 2265*l.* - 8*s.* - 4*d.*

ASSURANCE.

ASSURANCE,

To perform Queſtions in Aſſurance, obſerve the following Rule.

Rule.

Firſt, Multiply the Sum that you Inſure the Ship and Cargo for, by the rate *per Cent*, agreed on for Inſurance, Divide that Product by 100, and that Quotient will be the Sum to be puid for Aſſurance.

2dly, Multiply the given Sum, by the rate *per Cent*, that the Office is to pay the Inſurer in caſe of Loſs, the Divide as before and the Quotient will be the Sum payable to the Inſurer.

Laſtly, Subſtract the Sum paid to the Office from the Sum that the Office paid, add the remainder is the Loſs ſuſtained.

⁂

Example.

Examples.

A Merchant Inſured a Ship, bound to the Weſt Indies, for 1840*l.* and the Cargo for 6150*l.* for which he paid 9½ *per Cent*, and the Office in caſe of Loſt, was to pay him 90½ *per Cent*; now the Ship was caſt a way and nothing ſaved: I deſire to know how much the Merchant paid to the Office, what the Office paid him, and the Loſs ſuſtained?

£
1840
6150

7990
9½

71910
3995

759|05
20

1|00

£
7990
90½

719100
3905

7230|95
20

1|00

Anſwer,
759*l.* 1*s.* Paid to the Office
7230*l.* 1*s.* The Office paid him
6471*l.* 18*s.* Loſs ſuſtained.

BRO..

BROKAGE.

BROKAGE, or Brokerage, is an Allowance to Brokers, for aſſiſting Merchants or Factors, to buy or ſell Goods.

Rule.

Divide the given Sum by 100, and take parts from the Quotient for the rate *per Cent*, Add the parts together for the *Anſwer*,

Example.

What is the Brokage of 796*l.* 14*s.* 7*d.* at 6*s.* *per Cent?*

Anſwer, 2*l.* 7*s.* 9*d*½.

What's the Brokage of 979*l.* 6*s.* 4*d.* at 6*s.* 6*d.* *per Cent?*

Anſwer, 3*l.* 3*s*- 4*d*½.

◆

DISCOUNT.

DISCOUNT is an allowance made for payment of Money before it become due, or, for paying ready Money for Goods &c. when it is cuſtomary to have Credit.

Rule.

As 100*l.* with the Intereſt for the time given, is to that Intereſt; ſo is the Sum given, to the Diſcount required; then Subſtract the Diſcount from the Sum, and it will give the Anſwer.

Example.

How much ready Money can I have for a Note of 75*l.* due 15 Months hence, at 5 per Cent, per Annum?

Anſwer, 70*l.* 12*s.* 2*d.*

* * *

What is the Diſcount of 85*l.* 10*s.* due 66 Days hence, at 5 per Cent ?

```
 85l. 10s.     If 365 —— 4l. 5s. 6d. —— 66
        5               20
 ---------             ----
 4|27  10               85
   20                   12
 -------               ----
 5|50                  1026
   12                    66
 -------              ------
 6|00                  6156
                      6156
                     ------
                 365)67716(185½
                       3121
                        2016
                       -----
                         191
                           4
                       -----
                       -)764
                         ---
                          34

                 12)185½
                   -----
                    15 5½
```

Anſwer, 15*s.* 5½*d.*

What

Note, When the Time agreed on for Payment is of ſeveral Denominations, find the Intereſt of each Sum for the Time, then proceed as before; add all the Sums together and Subſtract that total from the given Sum, and the remainder will be the Anſwer.

Example.

I demand the Diſcount of 378*l*, if one half of the Money be paid at 6 Months and the other half at 12 Months, at 6 per Cent per Annum?

Anſwer, 16*l.* 4*s.* 1½*d.*

What is the preſent worth of 300*l.* payable at 3 four Months, at 5 per Cent per Annum?

Anſwer, 9*l.* 12*s,* 5½*d.*

Sold Goods to the amount of 287*l.* 15*s.* to be be paid at 2, three Months; how much Diſcount at 5 per Cent, muſt be allowed, if ready Money be paid down?

Anſwer, 5*l.* 5*s.* 8½*d.*

* * *

EQUATION.

EQUATION of PAYMENT.

IS when the payment of a Sum of Money becomes due at dfferent times, and it being agreed upon between the Debtor and Creditor, at a certain time for the payment of the whole Debt, ſo that neither may ſuſtain any Loſs.

Rule.

Multiply the Sum of each payment by the time, then Add the ſeveral Products together and Divide that Sum by the whole Debt, and the Quotient will be the juſt time for payment.

Example.

A owes B 200*l.* 100 to be paid in 3 Months, and the remainder at 6 Months; but they agreed to reduce the whole to one payment, I demand the time?

Anſwer, 4 Months.

C

C owed B 400*l.* and agreed to pay him 150*l.* in 4 Months, and the remainder in 6 Months; they at laſt agreed to reduce the whole to one payment, I demand the time?

400*l.*

$$\begin{aligned} 150 \times 4 &= 600 \\ 250 \times 6 &= 1500 \end{aligned}$$

$$4|00)21|00$$

Anſwer, $5\frac{1}{2}$ Months,

R is indebted to C 240*l.* whereof $\frac{1}{2}$ is to be paid at 3 Months, $\frac{1}{4}$ at 6 Months and the remainder at 9 Months; What is the equated time for the whole payment?

Anſwer, $5\frac{1}{12}$ Months.

If Q is indebted to R, the Sum of 300*l.* 1-3d to be paid at 3 Months, 1-3d at 6 Months and the remainder at 9 Months; now if it be agreed to reduce the whole to one payment, I demand the time?

Anſwer, 6 Months.

* * *

BARTER.

BARTER

BARTER is an excellent Rule to Merchants, and informs them how to Barter or Exchange one Article or Commodity for another, whereby neither of them may ſuſtain Loſs.

Rule.

Firſt. The value and Quantity of one Commodity being given, to find what Quantity of any other Commodity at a certain price, is equal in Barter to the firſt Commodity.

2dly. If A has Goods at a certain price for ready Money, but in Bartering with B for other Goods, will advance it to ſomething more; then you muſt find how much B muſt raiſe the price of his Commodity in proportion to the advance on A's Goods.

Example.

Example.

Two Merchants A and B, A hath Cinnamon at 40 Shillings per lb. B hath 12½ Cwt. Pepper at 5 Shillings per lb. how much Cinnamon muſt A give B in Barter for the Pepper?

Cwt, *l* —— lb. —— *l*
12½ 2 1 350
112 2|350
1344 175
56
5*s* is ¼ | 1400
350

Anſwer, 175lb.

Two Merchants, one hath Ginger at 2*s*. 4½*d*. per lb. the other hath Cotton at 1*s*. 8*d*. per lb. how much Cotton muſt be given in Barter for 9Cwt. 3Q 15lb. of Ginger?

Anſwer, 14Cwt. — 9lb.

Two Perſons Barter, one hath Sugar at 14*s*. per Cwt. ready Money, but in Barter will advance it to 18*s*. the other hath Currants at 22*s*. per Cwt. What Quantity of Currants muſt be given in Barter for 25 Ton 14 Cwt. of Sugar.

Anſwer, 21 Tons $9\frac{6}{11}$

A Merchant had 100 Pieces of Velvet worth 3*l.* per Piece ready Money, thoſe he Bartered with another Merchant, at 4*l.* per Piece, for Spaniſh Wool, at 7*l.* 10*s.* per Cwt. which worth but 6*l.* per Cwt. ready Money; I deſire to know, what Quantity of Wool was ſufficient to pay for the Velvet, which of the Merchants was the gainer, and how much?

Anſwer, The worth of the Wool, 320*l.*
The worth of the Velvet, 318*l.*
Loſt on the Velvet, 2*l.*

A Tobacconiſt hath 34 Tons 14-3-15lb. of Tobacco at 1*s.* 6*d.* per lb. this he Barters for Cloves, at 2|4 per lb. What Quantity of Cloves muſt he have for his Tobacco, ſo that neither may ſuſtain Loſt.

Anſwer, 22 T 6-2-23lb.

How much Tea at 9*s* per lb. can I have in Barter, for 4½ Cwt. Chocolate at 4*s* per lb.

Anſwer, 224lb.

LOSS and GAIN.

LOSS and Gain, is a Rule that teacheth us how to Retail our Goods, ſo as to gain, or loſe a certain Sum by the Sale thereof; for working which, the following is Inſerted.

Rule.

As the whole Quantity of Goods bought, is to the total Sum given added to the whole Profit or Loſs, ſo is any part of the Commodity, to the Price of that part of Commodity, or fourth Number required.

Example.

What is gained per Cent, on 100*l.* If one Shilling gain 2½*d.*

Anſwre, 20*l.* 6*s.* 8*d.*

If a Parcel of Goods be Sold for 780*l.* at 12*l.* per Cent, what was the prime Coſt?

Anſwer, 750*l.*

FELLOWSHIP

Without TIME.

THIS Rule is chiefly applyed to Merchants and others, who are in company with each other, and teacheth them how to proportion each Man's particular ſhare of Gain or Loſs, according to the Sum he paid in.

Rule.

Add every Man's Stock together for your firſt Number, make the whole Gain or Loſt the ſecond, and each Man's particular Stock the third Number; *Then ſay*, as the whole Stock is to the whole Gain or Loſs, ſo is each Man's Stock to his ſhare of Gain or Loſt.

Example.

Example.

A and B, A put in 40*l.* B 80*l.* and they gained 50*l.* I deſire to know each Man's ſhare of the gain?

Anſwer, { A's Share 16*l.* 13*s.* 4*d.*
B's Share 33*l.* 6*s.* 8*d.*

Proof, 50*l.* 0 0

Three Merchants made a Stock, C put in a certain Sum, D put in 5*l.* to C's 4*l.* and E put in 7*l.* to D's 6*l.* —they gained a certain Sum, of which C's ſhare is 100*l.* I demand D and E's ſhare of the Gain, likewiſe the Sum of the whole Gain?

Anſwer, { C's ſhare 100*l.*
D's ſhare 125*l.*
E's ſhare 145*l.* 16*s.* 8*d.*

Sum of the whole Gain 370*l.* 16*s.* 8*d.*

Two Merchants made a Stock of 947*l.* A put in 560*l.* and B the remainder, they gained 375*l.* *Qry.* each Man's ſhare of the Gain, and how much B put into Stock?

Anſwer, { A 221*l.* 4*s.* 10*d*, $\frac{14}{947}$
B 153*l.* 15*s.* 1*d.* $\frac{433}{947}$
B's Stock put in 387*l.*

TIME.

FELLOWSHIP with TIME.

FELLOWSHIP with Time, is when ſeveral Perſons enter into Partnerſhip for an unequal Time, *viz.* A will put in a Sum for four Months, B a Sum for ſix Months and C a Sum for eight Months, and ſheweth each Man's ſhare of the Gain or Loſs, according to his Stock or Sum put in for the Time mentioned.

Rule.

Multiply each Man's Stock by the Time it is put in for and the Sum of their Products muſt be the firſt Number, The whole Gain or Loſs the ſecond Number and each Man's Stock, Multiplied by it's Time the third Number.

* * *

Example.

Example.

Two Merchants companied together, the firſt put in the firſt of January, 450*l.* the other put in the firſt May, 750*l.* and at the year's end they had gained 100*l.* How much muſt each Man receive of the gain?

Anſwer, The former 47*l.* $\frac{7}{19}$. the later 52*l.* $\frac{12}{19}$.

Three Merchants in company, A laid in the firſt of January, 100*l.* and the firſt of April he took out 20*l.* B laid in the firſt March 60*l.* and on the firſt of Auguſt he laid in 100*l.* more; C laid in the firſt of July 150*l.* and on the firſt of October, he took out 50*l.* and at the year's end they had gained 160*l.* How much ſhall each Man receive of the Gain?

Anſwer,
A,s ſhare 56*l.* $\frac{248}{287}$.
B's ſhare 61*l.* $\frac{93}{287}$.
C's ſhare 41*l.* $\frac{233}{287}$.

A laid in 560*l.* for 4 Months, B 279*l.* for 5 Months, and C 735*l*, for 3 Months; they gained 100*l*, What is each Man's ſhare of the Gain?

Anſwer,
A's ſhare 383*l.* 11*s.* 2$\frac{3}{4}$*d.*
B's ſhare 238*l.* 17*s.* 4$\frac{3}{4}$*d.*
C's ſhare 377*l.* 11*s.* 4$\frac{1}{4}$*d.*

SINGLE POSITION.

THIS Rule is alſo called the *Rule* of *Falſe*, becauſe it teacheth us how by two Numbers, to find out the true Number required.

Rule.

Find two unknown Numbers, Add them together and proceed as in the Rule of Three.—Then make your ſuppoſed Numbers the firſt, your given Number the ſecond, and your falſe Number the third.

Example.

G, H and I, bought a quantity of Cheeſe, for 70*l.* they agreed that H ſhould pay twice as much as G, and I twice as much as H; how much muſt each pay for his part of the Cheeſe?

Anſwer,
G 10*l.*
H 20*l.*
I 40*l.*

I have a Ciſtern with three unequal Cocks, containing 60 Pipes of Water; and if the greateſt Cock be opened, that Water will run out in one hour, at the ſecond in two hours, and at the third in three hours: Now ſuppoſe all the Cocks be ſet open, how long will the Water be running out?

Anſwer, $32\frac{8}{11}$. Minutes

Gentleman Bought a Chaiſe, Horſe, and harneſs for 45*l*. the Horſe coſt twice the price of the harneſs, and the Chaiſe twice the price of the Horſe and harneſs; what did they coſt ſeperate?

Anſwer, { The price of the harneſs, 5*l*.
The price of the Horſe, 10*l*.
The price of the Chaiſe, 30*l*.

* * *

DOUBLE POSITION.

IN this Rule, two ſuppoſed Numbers is required; firſt think of any two Numbers for the Poſition, then proceed according to the following Rule.

Rule.

Multiply the Errors croſswiſe, and if the two Products are both alike, that is, both too much, or both too little; Subſtract the leſſer from the greater, of the two ſuppoſed Numbers fora Diviſor, and Subſtract the Product of the two Errors for a Dividend.

Example.

Three Men diſputing of their Ages, the firſt ſaid he was older than the ſecond by 2 years, the third ſaid I am 4 years older than both of you, and my Father who is 96 years of Age is as old as all of us; what was the Age of each?

Anſ. The firſt, 22, the ſecond 24, and the third 50, Years old.

Example.

Example.

A Man bequeathed 100*l.* between three old Men, to the firſt he gave a certain Sum, to the ſecond double the Sum of the firſt, leſs 8*l.* and to the third triple the Sum of the firſt, leſs 15*l.* How much was the ſhare of each ?

Anſwer,	The firſt Man,	20*l.*	10*s.*
	The ſecond	35*l.*	
	The third	46*l.*	10*s.*
	Proof	100*l.*	

Walking out one morning, I meet a Perſon who aſked me what o'Clock it was ? I told him to Add the $\frac{1}{4}$ of the hours that are paſt ſince Midnight, to the $\frac{2}{3}$ of the hours which are come until Noon, then you will have the juſt hour of the Day ?

Anſwer, 5 hours $\frac{11}{15}$

A Man had four Sons, whoſe Ages exceeded each other by 4 Years, and the youngeſt was juſt half the Age of the eldeſt; What was the Age of each ?

Anſwer, 24, 20, 16, and 12, the youngeſt Son's Age

Arithmetical PROGRESSION.

ARITHMETICAL Progreſſions, is a brief adding of ſeveral Numbers together, every one Surmounting the other by equal difference, as, 1, 2, 3, 4, 5, *&c.* Here the increaſe of theſe Numbers is by 1. Likewiſe, 2, 4, 6, 8 *&c.* the difference, or increaſe is by 2. Alſo 3, 6, 9 *&c.* whoſe increaſe is by 3.

Rule.

Firſt, find how many Numbers there are given in the Example, then Add the firſt and laſt Numbers together and Divide that Product by 2 for a Multicand; then Multiply that Sum by the Total of the Numbers given in the Queſtian, and that Product will be the Anſwer,

* * *

Example.

Example.

How many times doth a rigular Clock ſtrike in 12 Hours?

$$12+1=13,\ 13\times 6=78$$

Anſwer, 78 Times.

A Draper Sold 100 Yards of Dowlas, the firſt Yard for one Shilling, the ſecond for two, and ſo increaſing one Shilling every Yard; How much Muſt he receive for the ſaid 100 Yards of Dowlas?

Anſwer, 252*l.* 10*s.*

If 100 Stones be laid in a ſtraight line, one Yard aſunder from each other; how many Miles muſt a Man Travel, to gather the Stones ſeperately into a Baſket, one Yard from the firſt Stone?

Anſwer, 5½ Miles and 420 Yards.

A Man oweth me 200*l.* to be paid in 10 Years, at 20*l.* a Year; now if the whole Sum be Paid at one Payment, when will be the Time?

Anſwer, 5½ Years,

Geometrical PROGRESSION.

IS the Proportion of any Number of *Figures* bear to each other, as, 2, 3, 4, *&c.* for as the third are in Proportion to the ſecond, ſo are the fourth to the third, and ſo on proportionably.

Rule.

Firſt, Find the Sum of all the given Numbers, then Multiply that Sum by the Exceſs in the Progreſſion and that Sum leſs the firſt Number, Divided by 1 leſs than the Exceſs, will give the total Sum of all the Numbers, or Anſwer ſought.

Note, If your given Queſtian, conſiſteth of many Figures, find the Sum of $\frac{1}{4}$ or $\frac{1}{2}$ of the Numbers given in the Queſtian; then Multiply that Number by it ſelf, and that Product will double the Number of places leſs 1. See the following Example.

Example.

Example.

A Mercer Sold 15 Yards of Silk, the firſt Yard for one Shilling, the ſecond for 2*s.* the third for 3*s.* and ſo on in double Proportion; what did the 15 Yards coſt?

1, 2, 4, 8, 16, 32, 64, 128, the 8th, Term.
Then 128, Multiplied by 128,

1024
1536

16384 the 15 Place
2 Exceſs

32768 — 1 = 32767.
The Number of Shillings, which Divided by 20
is = 1638*l.* 7*s.* the Anſwer ſought.

A Farmer Sold 26 Sheep, at one Farthing for the firſt, a halfpenny for the ſecond, one penny for the the third. and ſo on in double Proportion; what did the 26 Sheep coſt?

Anſwer, 69905*l.* 1*s.* 3¾*d.*

Twenty Tinckers, 30 Coblers, 24 Bellowsmenders and the like Number of Pedlers, meet together at a Public-Houſe and ſpent 32 Guineas, which Sum was divided amongſt them in the following manner; that 4 Tinckers ſhould pay as much as 5 Coblers, 10 Coblers as 16 Bellowsmenders, and 8 Bellowsmenders as much as 12 Pedlers; how much is the ſhare of each Denomination towards the Reckning?

Anſwer,	The Tincker's ſhare	10G.
	Coblers' ſhare	12G.
	Bellowsmenders' ſhare	6G.
	Pedlers' ſhare	4G.
	Proof,	32G.

A Man agreed to pay a Pepper-corn the firſt Day, 2 Corns the ſecond Day, 4 Corns the third Day, and ſo double the Proportion every Day for 60 Days; what is the Number of Corns and value thereof, ſuppoſing 1000 Corns to weigh a lb. and each lb. be ſold for five Shillings?

Anſwer,	1152921504606846975 Pepper-corns.
	288230376151711*l.* 10*s.* The value.

FRACTIONS.

VULGAR FRACTIONS.

THERE are four kinds af Fractions, (*viz.*) Proper, Impoper, Mixt, and Compound.

A Proper Fraction is when the Numerator is leſs than the Denominator, as $\frac{1}{4}$ $\frac{1}{2}$ $\frac{3}{4}$ $\frac{1}{8}$ $\frac{3}{8}$ $\frac{5}{8}$ *&c.*

An Improper Fraction has it's Numerator greater than the Denominator, as $\frac{11}{8}$ $\frac{11}{2}$,

Mixt Fractions, are whole Numbers and Fractions together, *thus*, $2\frac{1}{2}$ $3\frac{1}{8}$ $4\frac{3}{8}$ $5\frac{3}{8}$ $6\frac{7}{8}$.

Compound Fractions, are known by having the word ,of, ſet between the Fractions, $\frac{1}{4}$ of $\frac{1}{8}$ of $\frac{5}{8}$.

N. B. Before we can proceed in the Rules of Addition, Subſtraction, Multiplication or Diviſion, you muſt perform Queſtions in Reduction, according to the five following Rules.

REDUCTION.

TEACHETH how to Reduce a whole Number into a Fraction, which Fraction ſhall be Equal in value to the whole, or mixed Number; it alſo teacheth to reduce a Fraction into it's equivalent, whole or mixt Number.

Rule.

If it be a whole Number, Multiply it by the aſſigned Denominator and ſet the Product for a Numerator over the Denominator.

Example.

Reduce 7 to a Fraction, whoſe Denominator ſhall be 5?

Thus $7 \times 5 = 35$ Facit $\begin{matrix}35\\3\end{matrix}$

Reduce 5 to a Fraction, whoſe Denominator is 12?

Anſwer, $\frac{60}{5} = 12$.

Reduce 7 to a Fraction whoſe Denominator is 6?

Anſwer, $\frac{42}{6} = 7$,

Reduce 8 to a Fraction, whoſe Denominator is 13?

Anſwer, $\frac{104}{8} = 13$.

Rule. II.

When a mixt Number or Quantity is given to be Reduced, Multiply the whole Number by the Denominator of the Fraction, adding thereto, the Numerator; and that Sum will be a new Numerator, which if ſet over the old Denominator will give a Fraction equal to the given mixt Number.

Example.

Reduce $2\frac{3}{4}$ to a Fraction?

Thus 4

———

$11 \div 4 = 2\frac{3}{8}$ for the *Anſwer*, ſought.

Reduce $6\frac{7}{8}$ to an improper Fraction ?

Anſwer, $^{5}\frac{5}{8} = 6\frac{7}{8}$

Reduce $4\frac{1}{4}$ to an improper Fraction ?

Anſwer, $^{1}\frac{7}{4} = 4\frac{1}{4}$

Reduce $8\frac{3}{4}$ to an improper Fraction ?

Anſwer, $^{1}\frac{9}{1} = 8\frac{3}{4}$

Rule III.

To Reduce improper Fractions, Divide the Numerator by the Denominator and that Product will be a whole Number Equal to the given Fraction.

Example.

Reduce $^{2}\frac{8}{4}$ to a whole Number ?

Anſwer, $28 \div 4 = 7$.

Reduce $^{4}\frac{2}{6}$ to a whole Number ?

Anſwer, 7.

Reduce $^{9}\frac{0}{9}$ to a whole Number ?

Anſwer, 10

Rule.

Rule IV.

To Reduce a Compound Fraction to a ſingle Fraction of the ſame value.

Multiply all the Numerators continually together for a new Numerator, and all tho Denominators together for a new Denominator, and their Products will be a ſingle Fraction.

Example.

Reduce $\frac{3}{4}$ of $\frac{1}{2}$ of 16, to a Single Fraction?

$3 \times 1 \times 16 = 48$ Numerator.
Then $4 \times 2 = 8$ Denominator.
Thus $\frac{48}{8} = \frac{6}{1}$ The *Anſwer*.

Reduce $\frac{1}{2}$ of $\frac{3}{4}$ of $12\frac{3}{4}$?

Anſwer, $\frac{153}{39}$.

N. B. By this Rule, a Fraction or mixt Number of a leſſer Name may be reduced to a Fraction of a greater Name by forming the ſame into a compound Fraction. See the following Example.

Example.

Example.

Reduce $\frac{5}{8}$ of Penny, to the Fraction of a £.

Anſwer, $\frac{5}{1920}$.

Reduce 1*s.* 7½*d.* to the Fraction of a Shilling.

Anſwer, $\frac{39}{480}$.

What's the value of $\frac{5}{8}$ of a Shilling.

Anſwer, 7½*d.*

What's the value $\frac{19}{240}$ of a £.

Anſwer, 1*s.* 7*d.*

What is the value of $\frac{27}{197}$, of a Shilling.

Anſwer, 1½*d.* $\frac{114}{971}$

What is the value of $\frac{2}{3}$ of $\frac{3}{4}$ of a Shilling ?

Anſwer, 1*s.* 0¼*d.* $\frac{650}{790}$.

* * *

ADDITION.

IF the Factions given to be Added, are of different Denominations, they muſt be Reduced to one Denomination, then Add the ſeveral Numerators together and ſet the total over the Denominator.

Example.

What is the Sum of $\frac{3}{7}$ and $\frac{4}{7}$?

Anſwer, $\frac{7}{7} = 1$.

What is the Sum of $\frac{4}{7}$ and $\frac{5}{9}$?

Anſwer $\frac{71}{63} = 1\frac{8}{63}$.

Add $\frac{3}{4}$ of a £. to the $\frac{5}{6}$ of a Shilling ?

Anſwer, 15*s.* 10*d.*

SUBST-

SUBSTRACTION.

Firſt, prepare your Fractions (if required) by Reduction, then take one Numerator from the other, as in the following

Examles.

From $\frac{3}{4}$, take $\frac{4}{9}$.
Thus $9 \times 3 = 27$ and $9 \times 4 = 36$, again $4 \times 4 = 16$
Then $27 - 16 = \frac{11}{16}$ for the Remainder.

From $5l. \frac{7}{8}$, take $\frac{9}{10}$ of $\frac{5}{6}$.
Rem. $5\frac{1}{8}l.$

What is the difference between $\frac{5}{9}$ and $\frac{3}{9}$?
Anſwer, $\frac{2}{9}$.

From 12*s.* 6*d.* Subſtract $6\frac{9}{12}$.
Rem. $\frac{69}{12} = 5s.\ 9d.$

From $19\frac{4}{12}s.$ Take $7\frac{5}{12}$.
Rem. $\frac{143}{12} = 11s.\ 11d.$

MULTI-

MULTIPLICATION.

To Multiply Fractions, Multiply the Numerators together for a new Numerator and the Denominators together for a new Denominator, then Reduce them to their loweſt Term.

Example.

Multiply $\frac{2}{5}$ by $\frac{3}{4}$
Thus $3 \times 2 = 6$, N. $3 \times 4 = 12$, D. $\frac{6}{12} = \frac{1}{2}$.

What is the Product of $2\frac{1}{2}$ by $2\frac{1}{2}$?
Anſwer, $6\frac{1}{4}$.

What is the Product of $5\frac{7}{12}$ by $7\frac{9}{12}$?
Anſwer, $6\frac{231}{144}$.

Multiply $\frac{3}{4}$ by $\frac{7}{8}$ *Anſ.* $\frac{21}{32}$.

Multiply $5\frac{1}{2}$*d.* by it ſelf.
Anſ. 5*s.* $0\frac{1}{2}$*d.*

DIVISION.

DIVISION.

To Divide Fractions, Multiply the Numerator of your Diviſor by the Denominator of the Dividend, and ſo likewiſe your other Denominator and Numerator, then Divide the Denominator by the Numerator for the Quotient ſought.

Example.

Divide $\frac{3}{4}$ by $\frac{2}{3}$. Thus $4 \times 2 = 8$ N. $3 \times 3 = 9$
Then $9 \div 8 = 1\frac{1}{8}$ for the *Anſwer* ſought.

What is the Quotient of $\frac{9}{12}$ Divided by $\frac{6}{9}$?
Facit $\frac{9}{8}$.

Divide $12\frac{4}{9}$ by $4\frac{3}{8}$
Anſwer, $\frac{15}{39}$.

* * *

DECIMAL FRAC-

DECIMAL FRACTIONS.

ADDITION.

DECIMAL Fractions is much the ſame as Vulgar Fractions, only the Fraction parts are ſet on the right hand of a Comma, and is perform'd as in common Arithmetic, only obſerve how many Decimal places you have, and point them off as in the following *Example.*

102,6
47,05
1,872
24,62
876,4

1051,542

Add 27, 9. 284,65. 9,4. 37,75. 32,25. together.
Anſwer, 391,95.

Add ,2078, ,092, ,08, ,1.
Anſwer, ,4798.

SUBSTRACTION.

From ,837, Take ,784; *Anſwer*, ,053. the Rem.

What is the Remainder of 295,094, leſs 78,19?
Anſwer, 216,904.

From 2,84. Take 1,098. Rem. 1,742.

From $5\frac{3}{4}$ Take $4\frac{1}{2}$, Thus *5,75—4,5* = 1,25.

From 37, Take ,104. Rem. 36,896

Borrowed 25*l.* and a Crown, paid 20 Guineas and 10 Shillings; what Remains due?
Thus 25,25—21,5 = 3,75. = 3*l*, 15*s*. the Rem.

From $4\frac{1}{2}$ Cwt. Take $2\frac{1}{4}$ = 1,75.

MULTIPLICATION.

IN this Rule you muſt point off as many Decimals as you have Decimal places in your Multiplicand and Multiplier, as in the following Example.

Example.

Multiply 1,30526 by 56,8
Thus 1,30526 × 56,3 = 74,138768, the Product.

What is the value of ,8687*l.*
Anſwer, 17*s.* $4\frac{1}{4}$*d.*

Multiply 2*s.* 6*d.* by 2*s.* 6*d*, Thus 2,5 × 2,5 = 6,25.
6,25 = 6*s.* 3*d.* for the Product

What is the Product of 4*l.* 5*s.* by 3*l.* 10*s.* ?
Anſwer, 14*l.* 17*s.* 6*d.*

Multiply 6*s.* 6*d.* by 5*s.* 3*d.* ?
Anſwer, 1*.l* 14*s.* $1\frac{1}{2}$*d.*

DIVISION.

THIS Rule is more difficult than the former and requires attention to find the true Value of the Quotient, but to make it the more eaſy the following *Rule* is to be obſerved.

Rule.

Firſt. You muſt point off as many Decimal places in the Quotient as the Dividend exceeds the Diviſor.

Secondly. If there be more Decimals in the Diviſor than in the Dividend, Add as many Cyphers to the Dividend as will make their Numbers equal.

Laſtty. When the work is done their muſt be as many Decimal places in the Diviſor and Quotient, as is containd in the Dividend, if not, you muſt Add as many Cyphers before the Quotient, as will make their Numbers equal.

Example.

Example.

Divide 17,75 by 5,25.
Thus $17,75 \div 5,25 = 3,38 + 50$. The *Anſwer*.

The ſame by common Arithmetic.
$17\frac{3}{4}$ Divided by $5\frac{1}{4}$, thus $17\frac{3}{4} \times 4 = 71$. $5\frac{1}{4} \times 4 = 21$,
Then $71 \div 21 = 3\frac{8}{21}$.

Divide ,063 by ,12 = ,00525, the Quotient ſought.

Divide 34,125 by 5,25.
Anſwer, 6,5.

Divide 14,875 by 3,5.
Anſwer, 4,25.

Divide 10,55439 by 4,569.
Anſwer, 2,31.

Note. If it be required to Divide any Sum by 10, 100, *&c.* point off as many Figures towards the left hand of the Dividend, as there are Cyphers in the Diviſor.

Divide 247 by 10, thus $247 \div 10 = 24,7$.

Divide 48720 by 100 = 487,20.

Divide 27649 by 1000 = 2764,9.

* * *

SQUARE ROOT.

SQUARE ROOT.

THE Extraction of the Square Root is this, by having a Number given we find out the Contents, or Anſwer required.

All ſquare Numbers, together with their reſpective Roots, are expreſſed in the following Table.

Squares,	1	4	9	16	25	36	49	64	81
Roots,	1	2	3	4	5	6	7	8	9

N. B. The ſquare of any Root, is the Product of that Root, Multiplied by it ſelf.

Rule.

Firſt. Set a point over every other Figure of the given Number, beginning at the right hand.

2*dly.* Find the Root of the firſt Point on the left hand ſide of of the Number, and place the Root in the Quotient, and Subſtract the product of that Root from the firſt, then to that remainder bring down the next point, which is called a reſolvend.

3*dly.* Draw a crooked line on the right hand of the Reſolvend and place before it the double of the Root in the form of a Diviſor; find how many times the Diviſor is contained in the Reſolvend, (always omitting the units' place,) then place that Quotient up in the Root and likewiſe on the right hand of the Diviſor.

Laſtly. Multiply the Diviſor by the laſt Figure in the Root and Subſtract that product from the Reſolvend; if there be any more Points in the Sum, bring them down and proceed as before.

Example.

What is the Square Root of 676?

```
      .   .
      6 7 6 ( 2 6   Root
  4 6 ) 2 7 6   Reſolvend.
      . . .
```

What is the Square Root of 1156 ?

Anſwer, 34.

What's the Square Root of 728 ?

Anſwer, 28.

What is the Square Root of 22071204 ?

Anſwer, 4698.

I demand the Square Root of 3076416 ?

Anſwer, 1754.

What is the Square Root of $16\frac{1}{2}$ Feet ?

Anſwer, ,5.

To find the Square Root of a Vulgar Fraction, find the Root of the Numerator for a Numerator, and let the Root of the Denominator be it's own Denominator ; *thus*, the Square Root of $\frac{4}{9}$ is $\frac{2}{3}$.

What is the Square Root of $\frac{16}{95}$?

Anſwer, $\frac{4}{5}$

What is the Square Root of $27\frac{9}{16}$?

Anſwer, $5\frac{1}{4}$

What is the Square Root of 19,2 ?

Anſwer, 1,4817.

* * *

C. ROOT.

CUBE ROOT.

IS to find out the contents of all ſolid Bodies, for as the Square Root teacheth how to find the contents of any ſquare thing whoſe Root being Multiplied by it ſelf, that Product will be equal to the given Sum whoſe Root is required; ſo the Root of a Cube is Multiplied by it ſelf, and that Product by the firſt Root, and that Product will be equal to the given Sum, whoſe Cube Root is required.

N. B. All Cube Numbers with their reſpective Roots are expreſſed in the following TABLE.

Cubes,	1	8	27	64	125	216	343	512	729
Roots,	1	2	3	4	5	6	7	8	9

Rule.

Firſt. Point off every third Figure, in the ſame manner as you did every ſecond Figure in the Square Root; then find the Root of the firſt point and place it up in the Quotient, then Subſtract as in the laſt Rule.

2*dly.* Bring down to the remainder, the next point and call it a Reſolvend; triple the ſquare of the Root and place it under the left hand Figure, then triple the Root and place it under the next Figure on the right hand ſide and add them together for a Diviſor.

3*dly.* Seek how many times the Diviſor is contained in the Reſolvend, (omitting the laſt Figure in the units' place of the Reſolvend,) and place it up in the Quotient.

Laſtly. Cube the laſt Figure in the Root and place it under the Figure on the right hand ſide, triple the ſquare of the Figure laſt placed in the Root, then Cube the laſt Figure in the Root, and place it in the units' place; add all the ſums together, which Sum Subſtract from the Reſolvend and ſet dow the remainder (if any) and proceed as before.

* * *

Example.

Example.

What is the Cube Root of 1728?

$\dot{1}72\dot{8}$ (12 Root
1

728 Reſolvend.

3 Triple ſquare of the Root.
3 Triple of the Root.

33 The Diviſor.

6 Triple of the Root 2.
12 Triple ſquare of the Root 2.
8 Cube of 2.

728 *Ablatitium.*

· · ·

What is the Cube Root of 157464?
Anſwer, 54.

What is the Cube Root of 926859365?
Anſwer. 975.

What is the Cube Root of 12,977875?
Anſwer, 2,35.

CROSS MULTIPLICATION.

Multiply 2 Shillings and 6 pence, by 2 Shillings and 6 pence.

2*s*. 6*d*.
2*s*. 6*d*.

5 – 0
1 – 3

6 – 3.

Anſwer, 6*s*. 3*d*.

Multiply 3 Feet 9 Inches, by 2 Feet 3 Inches.
Anſwer, 8 Feet 5 Inches 3 Parts.

Multiply 6*s*. 6*d*. by 4*s*. 3*d*.
Anſwer, 1*l*. 7*s*. 7½*d*.

How many Feet of Glaſs are contain'd in a Window 5¼ Feet high, and 3 Feet 4 Inches wide?
Anſwer, 17 F. 5 I. 8 P.

Queſtians.

Practical Queſtians.

A Boy was Driving a flock of Sheep on the Road, a Gentleman riding by ſaid, my little Boy where are you going with your 18 Sheep, You are miſtaken Sir ſaid the Boy, but had I as many more, I ſhould have as many above 18 as I have now leſs than 18, how many Sheep had he ?

Anſwer, 12.

A Burgeſs would diſtribute a certain Number of Pence amongſt ſeveral poor people, but after he had counted his Money, he found that if he ſhoul give them ſixpence each, he ſhould want 14*d*. But if he ſhould give each perſon but fivepence, he ſhould have 9*d*. over ; what was the Number of People ?

Anſwer, 23.

A Man diſtributed 20*s*. between Men, Women and Children, to each Man 20*d*. each Woman 15*d*. and each Child 8*d*. How many Men, Women and Children of each did receive part of the 20*s* ?

Anſwer, 2 Mem, 8 Woman and 10 Boys.

How many days will it require to place ſeven Men at Table, every Day in different order?

Anſwer, 5040, Days.

Whereas a Noble and a Mark, juſt 15 yards did buy,
How many Ells of that ſame Cloth, for 50*l.* had I?

Anſwer, 600 yards.

If 15 lb. coſt 16*d* of Bread that's made of Rye,
How many loaves of 6lb each, for 80*l.* had I?

If 5 Hundred of Sugar coſt 56 Pounds,
How many full Hundreds, for 96 Crowns?

Anſwer, 2 Cwt. 16lb.

If 15 Tons of Lead coſt 16*l.* in Gold,
How much of that Saturnian Ore, for 40*l.* was ſold?

Anſwer, 37½ Tons.

If 30 pence and 40 groats, buy 50 pints of Wine,
What is the coſt of 60 quarts, in currant engliſh coin

Anſwer, 38

If 16 Shillings and a Crown, doth 13 Weeks ſupply,
For meat and drink, that is my board; how much a day gave I?

Anſwer, 2¾*d.*

If the half of a Mark, buy a quarter of a pound,
How much Cinnamon can I have for Crown?

Anſwer, 3 oz.

If a Staff juſt 3 feet long, doth give 5 feet of ſhade,
And a Steeple 99; how high in feet was he made?

Anſ. $59\frac{2}{5}$.

Ingenious youths I pray engage,
Your thoughts ſometime to find my age;
From what's below I make no doubt,
But you may eaſy find it out.

Multiply half my Age, by half a Score,
And from that Product take ſeventy-four;
Add to it four, Divide by thee,
What is my Age, you'll plainly ſee.

Anſ. 35.

A Man dying, gave to his eldeſt Son $\frac{2}{3}$ of $\frac{1}{4}$ of his eſtate, to his ſecond Son $\frac{1}{5}$ of $\frac{1}{2}$ of his eſtate, and when they had counted their Portions, the eldeſt Son had 40*l.* more than his Brother, and all the reſt of his eſtate he gave to his Wife and younger Children.

How much had each Son to his Fortune, likewiſe the Sum that was left to the Widow and younger Children?

Anſwer,
100*l.* The eldeſt Son's ſhare.
60*l.* The 2nd Son's ſhare.
440*l.* The Widow and youngeſt Children's ſhare.

* * *

Two travellers, one from London to Bridgwater, and travels every day 8 Miles; the other from Bridgwater to London, travels every day 6 Miles; how many days muſt they travel before they will meet each other, and how many miles each will have travelled, ſuppoſing they ſet out both at one time.

Note Bridgwater is 126 Miles diſtant from London.

Anſwer, { in 9 Days
72 Miles and
54 Miles.

There is Garriſon whoſe Wall is 21 Feet high, and a Moat ſurrounding the Wall 28 Feet wide; now what length muſt a ſcaled-ladder be to reach from the top of the Wall, to the outſide verge of the mote?

Anſwer, 35.

Bought an Acre of Graſs in the middle of a Meadow, in the form of a Parallelogram, whoſe length is 20 Perch; I demand the breadth?

Anſwer, 8 Perch.

If the baſe of a Cylinder be 1,6619 foot, how much in length of that Cylinder will make a foot ſolid.

Anſwer, ,601.

What number of ſhot is contained in a triangular pile, having 12 in its firſt courſe?

Anſwer,

If a Table is 24 Inches Diameter, what is the ſuperficial Content?

Answer, ... 2 F. 4 I.

Moſes was born Anno Mundi 2433, Joſeph died 68 Years before the birth of Moſes, and Abraham 813 Years before Joſeph, Solomon's Temple was built 1012 Years before the birth of CHRIST;—now as CHRIST was incarnate 4004 Years after the Creation; the interval of Time between the birth of Abraham and the building of Solomon's Temple is required.

Answer, ... 1436 Years.

An elderly Perſon in Trade is deſirous of admitting a ſober induſtrious young Man to a ſhare of his Buſineſs, and to encourage him, promiſes, that if he can advance £100, his pay ſhall be £40 per Annum; if he advanced £200, he ſhould have £55 a Year, and if £300, he ſhould receive 70*l.* annually; in this propoſal what was allowed him for his attendance ſimply?

Answer, ... £25, ℘ Annum.

On the Steep-holms in the Briſtol Channel, was a Light-Houſe built, the Diſtance between the place of Obſervation and that part of the Rocklevel directly under the Houſe is 250 Fathoms,—the Diſtance from the top of the Rock to the ſame place of Obſervation is 396 F. and from the top of the Lighthouſe to the ſame place of Obſervation is 402 Fathoms,—hence it is required to find the height of the Edifice?

Answer, ... 7,698 Fa.

A merry young Fellow, in a very ſhort Time, ſpent the $\frac{1}{5}$ of his Fortune, he then bought an Exempt's Place in the Army for which he paid £2200.—his profuſion continued till he had no more than 880 Guineas left, which he found by computation to be juſt $\frac{3}{20}$ of his Money after the Commiſſion was bought;—pray what was his Fortune at firſt?

Answer, ... £10450.

Sally told her Brother Harry that tho' her Fortune on her marriage, took 19312 Pounds out of the Family, it was but $\frac{3}{5}$ of two years Rent;—Heaven be praiſed for this yearly Income! pray what was it?

Answer, ... £16093. 6. 8.

Two Travelers, A and B, ſet off at the ſame Time, A from London to Lincoln, and B, from Lincoln to London, the Diſtance being 100 Miles; at 8 Hours they met on the Road, and it appeared that A had traveled $2\frac{1}{2}$ Miles in an Hour more than B,—at what rate ꝑ Hour did each of them travel?

Answer, ... { A, $7\frac{1}{2}$ Miles.
B, 5 Miles.

In an article of Trade A gained 14*s.* 6*d.* and his Adventure 35s. more than B, whoſe ſhare of the Profit is but 8*s.* 6*d*, what was the particulars of their Stock?

Answer, ... { A, £4. 4. 7.
B, £2. 9. 7.

Double my Money for me ſays A to B, and I will give thee Sixpence out of the Stock, with the Remainder he applied unto C with equal Succeſs, and gave him alſo Sixpence; he repeated this to D and gave him Sixpence which was all the Money he had left;—pray what had he to begin with?

Answer, ... $5\frac{1}{4}$*d*,

On Monday laſt was lanched at Black-wall, an Eaſt-India Ship, her Length by the Keel is 120 Feet, and by the Beam 50 Feet; what is the Length of her Main Maſt?

Answer, ... 180 Feet.

I would plant 2072 Apple-Trees in 14 Rows, 25 Feet aſunder; how long will this Grove be?

Answer, ... $616\frac{2}{3}$ Feet.

The ſum of two Numbers is 360; the Leſſer 114: what is their Difference, Product and larger Quotient?

Answer, ... 132 dif. 28044 pro. $2\frac{3}{19}$ quo.

What Number multiplied by 72084, will produce 5190048 exactly?

Answer, ... 72.

What quantity of Water muſt you add to a Pipe of Wine, value £38, to reduce the firſt Coſt to five Shillings ⅌ Gallon?

Answer, ... 26 Gallons.

Part 250 Pounds between A, B and C,—give A £37 more than B, and C 28 leſs than B, and tell me the ſhare of each?

Answer, - - - - - - - - - - - - - - A's *l*117. 6. 8.
B's *l* 80. 6. 8. ⅌ Share.
C's *l* 52. 6. 8.

Perſon poſſeſſed of three-fiſths of a Coppermine, and sold three-fourths of his ſhare for 1710 Pounds; what was the reputed Value of the whole of his Intereſt in the ſaid Mine?

Answer, - *l* 3800

A, can do apiece of Work in 10 days, B, in 13 days, ſet them both about it and tell me in what time both will finiſh it?

Answer, - $5\frac{15}{23}$ days

If by remitting to Holland, at 31s. 9d. Flemiſh ⅌ Pound Sterling, five ⅌ Cent is gained;—how goes the Exchange, when by remittance I clear 10 ⅌ Cent?

Answer, - $33^{s}.\ 3\frac{1}{7}$d.

Practical Questions
IN
GEOGRAPHY, ASTRONOMY,
AND
PHILOSOPHY:

Rule.

THE Effects or Degrees of *Light*, *Heat* and *Attraction*, are reciprocally proportional to the Square of their Diſtances from the Centre, whence they are propogated.

Velocity, It has alſo been proved, that the Velocity acquired by the Bodies in falling, are in proportion to the Times in which they are falling.

Quantities of Matter, in any two or more Bodies, put in Motion, be equal, the Forces wherewith they are moved, will be in proportion to their Velocities.

2. If the *Velocity* of theſe Bodies be equal, their Force will be directly as the Quantities of Matter contained in them.

3. If both theſe *Quantities of Matter* and the *Velocities* be unequal, the Forces with which Bodies are moved, will be in a Proportion, compounded of the Quantities

they contain, and of the Velocities wherewith they move.

Motion, By comparing the *Motion of Bodies*, if their *Velocities* be equal, the Spaces deſcribed by them ſhall be in the direct Proportion of the Times in which they are deſcribed.

2. If the *Times* be equal, then the Spaces deſcribed will be as their Velocities.

If the *Times* and the *Velocities* be unequal, the Spaces will be in a Proportion, compounded of the Times and Velocities.

The quantity of Matter contained in all ſpheres, are directly in proportion to the Cubes of their Diameters, then, if a Bullet of Caſt Iron, 4 Inches Diameter, weigh's experimentally 9lb. what is the Difference of the Weight of one $13\frac{1}{2}$ Inches, and another, $7\frac{1}{2}$ Inches?

Answer, ... 287lb. nearly.

Suppoſe the Earth and the Moon to be exact Spheres, as they are not,—the Earth's Diameter 7970 Miles, and that of the Moon 2173 Miles, what compariſon is there between them in point of Magnitude?

Answer, ... 49 tines larger than the Moon.

Our Satellite the Moon, is a Globe in Diameter 2170 Miles, and ſuppoſing her to be a concave, how many quarters of Grain would ſhe contain, allowing $2150\frac{4}{10}$ ſolid Inches to the Buſhel: and ſuppoſing her to be covered with yard-wide Stuff,—how many Yards will it require to complete the Garment.

Anwser, { Contents 7910703494847014400 Quarters.
Surface 45824284391424 Yards Square.

Suppoſe the Atmoſphere or Body of the Air and Vapours, ſurrounding the Globe of the Earth and Sea to be 60 Miles above the Surface ; the Earth is 7970 M. in Diameter ;— how many cubic Yards of Air then hang about and revolve along with this Planet ; and what is the weight of the whole Maſs of fluid Matter in the Atmoſphere contained at a medium 12lb. Avoirdupoiſe be found experimentally, as in fact it is. to preſs upon every circular Inch, on the Surface of the Earth ?

Answer, 6626425427414876160 ſolid Yards,
Weight 12240191636766672000 Pds. Avoirdupoise.

There are two Bodies, the greater contains 8 times the Quantity of Matter in the leſs, and is moved with a Force 41 times greater ;— the *Ratio* of the Velocity is required ?

Answer,........ The greater to the leſs, as 6 to 1.

A Cannon-Ball weighing 20lb. is impelled by ſuch a Force as to ſend it 100 Yards in a Second ; with what Velocity would a Ball of 8lb. move, if it were impelled by the ſame Force ?

Answer, ... 250Yards in a Second.

A Veſſel at Sea fires a ſignal Gun of Diſtreſs, and in 3 Seconds after ſeeing the Flaſh, heard the report ; how far off then was that Ship ?

Answer, ... 13 M. 5 Fur. 31 Poles, nearly.

Suppoſing one Body to move 33 times ſwifter than another, the ſwifter to move 12 Minutes, the other only 1 What Difference will there be between their Spaces by them deſcribed, ſuppoſing the laſt has moved 60 Minutes ?

Answer, ... 1795 Feet.

Mercury, the neareſt of the Planets to the ſource of Heat, Light and Life, in our Syſtem appointed, the Sun, is about 32 Millions of Miles from him ; *Saturn* the remoteſt of the Planets is uſually diſtant about 777 Millions of Miles : What Compariſon is there between the Solar Influences of thoſe two Bodies.

Answer, ... As 1024 to 6023729.

What Weight will a Man be able to raiſe, by preſſing with the Force of one Hundred and Half, at the End of an equipoiſed Hand-ſpike 100 Inches long, which is to meet with a convenient Prop, exactly 7½ I. above the nether End of the Machine ?

Answer, ... 2077 lb.

NOTE, The Author of this Work has not designed these Questions particularly for the Use of Pupils in general, but to those whose Thoughts are enlightened for the Sublimity of those most grand SCIENCES ; and, he likewise most earnestly request the same might be read to Pupils in general, in order to give them a zealous Taste for Learning, Religion, and Piety.

* * *

Practical Questions IN MENSURATION, &c.

IT was o'er a rich Meadow I happen'd to pass,
I saw a poor Creature, which prov'd to be an Ass;
Tho' a Beast not large, nor esteemed for his Strength,
Was confin'd by a Cord, just sixty Yards in Length;
The Owner was well pleased to see him so feed,
And said he would buy it if could but succeed;
So much of the Meadow as the Ass could feed round,
And for every Perch he would pay just One Pound;
The Contents of the Meadow that the Ass could feed on,
Sir, I beg you will explain before it be long;
And likewise for the Purchase, what he is to pay,
You'll answer my Question and go wiser away;
By comm'n Reduction,------let it be sought,
It will shew the best Method that ever was taught;
In this Solution may your Judgment excel,
And you'll oblige your humble Serv. R. CHAPPELL.

Thus, $60\times2=220\times22\div7=3711\text{-}7\div21=374$ P.
Then $374\div40=9+14$, $9\div4=2+1$.

Answer, 374 Perch, the Contents,
And 374£ the Purchase.

'Twas on a clear Day, the Sun shining bright,
I saw a long May- Pole standing upright;
To know the Length, I a Measurement made,
By meas'ring a Stick, and the Length of the Shade,
A Staff of five Feet, made three Feet in length,
The shade of the Pole, was forty Feet One-tenth;
The Length of the Pole I beg you will show,
For that's the Answer I desire to know?

Answer, ------------------------------ 66,8. Feet.

Two Ships upon the Equinoctial Line,
One rung the Bell at six,—th' other at nine;
What 's Distance in English Miles pray tell to me,
And for so doing you shall rewarded be.

Answer, ------------------------------ 3127½ Miles.

Four Men bought a Grinding-stone, 60 Inches Diameter for which they paid 30 Shillings, in the following manner; the first Man paid 12s. the second Man 9s. the third 6s, and the fourth 3s.—how much must each Man grind down of the said Stone proportionably to his Money paid?

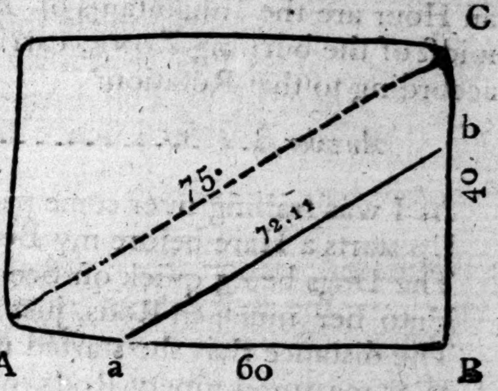
Inches,
Answer, ------------------------------ 6,77
6,80
6,95
to the Centre. 9,48

Proof 30.

The Sum of two Numbers is 360, the Leſſer 114; what is their Difference, Product and larger Quotient;

Answer, 132 gre. 28044 pro. 2 3- 19. quo, A Field in the form of a Parallelogram, the Length is to the Breadth as 3 to 2 and the Contents, 15 Acres; from hence it is required to find the width of a Diagonal Coach-Walk, its Area ſhall contain One-ſixteenth Part of the ſaid Field?

$15 \times 4 \times 40 = 2400.$



$2400 \div 2 + 2400 = 3600\ \overset{2}{\surd}$ is 60.

$2400 \times 2 \div 3 = 1600\ \overset{2}{\surd}$ is 40

$60 \times 40 = 24 \div 16 \div 2 = 75.$

The □ of A B = 360.

The □ of A B = 1600, + 3600 = 5200 $\overset{2}{\surd}$ is 72,11.

The □ of a B = 2916.

The □ of B b = 1156 + 2916 = 4072 $\overset{2}{\surd}$ is 63,81.

72,11 + 63,81 = 135,92, ÷ 2 = 67,96, × 6 = 407,76:

Then, as 407,76 : 6 : : 75 : 1,1; equal to $\frac{1}{2}$ the width of the Walk, or nearly, which, × 2 = 2,2 that is a Perch and 2 Tenths ⅌ Answer sought.

Four Figures of *nine* may be ſo placed as to denote and read for 100, neither more nor leſs,—pray how is that to be done? Answer, $\frac{9}{9} + 99$.

The Globe of the Earth, under the Line, is 360 Degrees in Circumference, each Degrees $69\frac{1}{2}$ Miles ; and this Body being turned on its own *Axis*, in the Sydereal Day, or 23 Hours and 56 Minutes ; —at what rate an Hour are the Inhabitants of *Bencolen*, ſituate in the midſt of the burning ZONE, carried from Weſt to Eaſt, according to that Rotation?

Answer, ------------------------ $1045\frac{145}{359}$.

As I was trailing over some paſture Grounds,
Up starts a Hare before my Beagle-Hounds ;
The Dogs being quick on Scent, did ſwiftly run,
Unto her nineteen Rods, just twenty-one ;
The diſtance that she ſtarted up before.
Was meaſured ninety Rods, no leſs nor more ;
Now unto me I'd have you this declare,
How ſar they ran before they caught the Hare ?

Answer, ------------------------ 945 Rods.

Put out to Intereſt £384, and in $8\frac{1}{4}$ Years, there were found to be due £542. 8. at what rate ℘ Cent, was the Money lent ?

Answer, ------------------------ 5 ℘ Cent

There are two pieces of Clock-work, running with a Fly, will each of them lower a weight uniformly, to the Depth of 35 F. the firſt Weight, *A*, deſcends $\frac{13}{16}$ of an Inch in an Hour ; and when it is let down 12 F. the Second, or *B* ,is put off and the train of Wheels belonging to this Machine are ſo ordered, that the Weights will be in the ſame Level 100 Inches before they come to the Bottom : The Velocity of *B*'s Deſcent is required?

Answer, ... $1\frac{2}{11}$ M. ℘ Hour.

Multiply 10 Feet 6 Inches by 2 Feet 9 Inches?

By Croſs-Multiplication.

10 6
2 9

7. 10. 6.
21. 0.

28. 10, 6.

By Practice.

10. 6.
2.

21. 0-
6. is ½ 5. 3.
3. is ½ 2. 7. 6.

Answer.................................... 28. 10. 6.

By Decimal Fractions.

10,5
2,75

525
775
210

28,175
12

10,500
12

6,0

⅌ *Answer*, 28F. 10I. 6P.

By com. Arithmetic.

10 6
12

126
33

878
378

144)4158(28
1278

12(126)10

6

...............The ſame by common Arithmetic.

What ſum of Money at 3½ ⅌ Cent will clear £38. 10s. in 15 Months.

Answer,.................................... £880.

There is a *City* in a certain Iſland, 708 Miles more diſtant from the Tropick of Cancer, than another under the ſame Meridian is from the Artic Poler Circle: What City is that;—what are their Diſtances from the Equator, and what from each other:—The Polar Circle is $23\frac{1}{2}$ Degrees from the Pole, as is the Tropic from the Equator,—in this Place, pleaſe to conſider 60 Geographical Miles to a Degree?

Anſwer, Both ſtand on the ſame Spot, in Latitude 50 Degr. 54M. and Anſwers to Chicheſter in *Suſſex*.

My Water-Tub holds 147 Gallons, the Pipe uſually brings in 14 Gallons in 9 Minutes,—the Tap diſcharges at a medium 40 Gallons in 31,—now ſuppoſe both of theſe Cocks were left open, and the Water turned on at two o'Clock in the Morning; the Servant at 5, finding the Water running ſhuts the Tap, and is ſolicitous to know in what Time the Tub will be full after this Accident; in caſe the Water continues flowing on the Main?

Anſwer, ... $3'$. $48''$. after 6 o'Clock.

A, being aſked what was the preſent Hour of the day, anſwered, that the Time paſt from the Meridian was equal to $\frac{1}{5}$ of $\frac{3}{8}$ of the Time remaining until Midnight: The Queſtion is, what Time of the Afternoon was it?

Anſwer, -........................... $\frac{36}{43}$ P.M.

A Farmer having incloſed in the middle of a Field, a Garden in the form of a Parallelogram, the Length is 20 Perches, pray what is the Breadth,—the Contents being juſt one Acre? .... *Anſwer*, 8 P.

A Piece of Wainſcotting, 3F. 10,high and 86F. 3I. long, to find the ſuperficial Contents? Thus, 86, 3.
multiplyed by 3. 10.

71. 10. 6.
258. 9.

Answer, ... 330. 7. 6.

Dr. KEIL computes the diſtance of the Sun from us to be 115 times his Diameter; how much hotter is it then at the Surface of the Sun, then under our Equator?

Answer, ... 13225 Degrees.

On the Top of a Hill *(called Glastonbury Torr)*, near Glaſtonbury, in the County of Somerſet, is a TOWER, the Diſtance from the Top of the Tower, to the place of Obſervation, at 420 Feet from the Perpendicular Line on the Baſe is 602, and from the Top of the Hill to the ſame place of Obſervation is 560,—from hence the Hight of the Tower is required?

Answer, ... 60,38 Feet.

FINIS

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